GRAVELY

Service Manual

ZT X
ZT XL

Models

918007 – ZT X 42
(SN 000101 +)

918008 – ZT X 42
(SN 000101 +)

918009 – ZT X 48
(SN 000101 +)

918010 – ZT X 52
(SN 000101 +)

918011 – ZT X 52
(SN 000101 +)

918012 – ZT XL 42
(SN 000101 +)

918013 – ZT XL 48
(SN 000101 +)

918014 – ZT XL 52
(SN 000101 +)

918015 – ZT XL 52
(SN 000101 +)

918016 – ZT XL 60
(SN 000101 +)

E10 E15 E20 E85

EN ENGLISH

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WELCOME

MANUALS

Before operating or servicing the unit, carefully and completely read the Service Manual, Operator's Manual, and Engine Manual provided with the unit. They contain safety instructions and important information about unit controls.

The engine on this unit is covered by a separate manual. Refer to the engine manual for engine service recommendations. Contact the engine manufacturer for a replacement manual if necessary.

Your dealer must review important information in this manual with you before or upon delivery of the unit. It is your responsibility to read and understand all safety precautions and instructions in the manuals. If you do not understand or have difficulty following the instructions, contact your Gravely dealer for assistance. To locate your nearest Gravely dealer, go to www.gravely.com.

A parts manual for your unit is available for free download or purchase at www.gravely.com.
Manual del operador español está disponible para su descarga gratuita o compra en www.gravely.com.

DISCLAIMER

Gravely reserves the right to discontinue, make changes to, and add improvements upon its products at any time without public notice or obligation. The descriptions and specifications contained in this manual were in effect at printing. Equipment described in this manual may be optional. Some illustrations may not be applicable to your unit.

Gravely recommends using only genuine Gravely replacement parts on this unit. Using unauthorized parts may adversely affect the performance, durability or safety of this unit and may void the warranty. Installing unauthorized parts will not automatically void the warranty; however, the warranty will not apply if the installation and use of unauthorized parts damages the unit. The Gravely warranty applies solely to defects in Gravely materials and / or factory workmanship. Gravely disclaims liability for any claims or damages – whether warranty, property damage, personal injury or death – arising from using unauthorized replacement parts.

Be aware of your mechanical aptitude when applying information in this manual for service and / or repairs. If you are not comfortable or capable of completing service and / or repairs to the machine, take the machine to an authorized Gravely service dealer.

SAFETY

Read these safety rules and follow them closely. Failure to follow these rules could lead to loss of control of unit, severe personal injury or death to you or bystanders, or result in damage to property or the machine.

PRACTICES & LAWS

Practice usual and customary safe working precautions. Learn applicable rules and laws in your area. Always follow the practices set forth in this manual.

EMISSION CONTROL SYSTEM

This equipment and / or its engine may include exhaust and evaporative emissions control system components required to meet U.S. Environmental Protection Agency (EPA) and / or California Air Resources Board (CARB) regulations. Tampering with emission controls and components by unauthorized personnel may result in severe fines or penalties. Emission controls and components can only be adjusted by an Gravely dealer or an authorized engine manufacturer's service center. Contact your Gravely Equipment Retailer concerning emission controls and component questions.

REQUIRED OPERATOR TRAINING

Read and understand the Operator's Manual and decals on the unit. This information is for your safety and the proper use of your equipment. Failure to follow these instructions and warnings may cause death or serious injury. If you have purchased this product from an Gravely dealer, the dealer can provide you with training.

Familiarize yourself and any other operators with all controls and the safe use of the features of this unit. If you loan, rent or sell this product to others, provide them with all manuals.

If you have any questions, please call our customer support line at 920-756-4688 or contact us at www.gravely.com. Do not use this equipment if, after reading the Operator's Manual and the on-board decals, you have any questions about the safe use of this product.

WARNING: AVOID INJURY.

This cutting machine is capable of amputating hands and feet and throwing objects. Failure to observe the safety instructions in the manuals and on decals could result in serious injury or death.

ALWAYS stop unit and engine, remove key and allow moving parts to stop before leaving operator's position.

SAFETY ALERT SYMBOL

This is the safety alert symbol. It means:

- **ATTENTION!**
- **YOUR SAFETY IS INVOLVED!**

When you see this symbol:

- **BECOME ALERT!**
- **OBEY THE MESSAGE!**

SIGNAL WORDS

The safety alert symbol above and signal words below are used on decals and in this manual. Read and understand all safety messages.

1. Danger

DANGER: Indicates an IMMINENTLY HAZARDOUS SITUATION! If not avoided, WILL RESULT in death or serious injury.

2. Warning

WARNING: Indicates a POTENTIALLY HAZARDOUS SITUATION! If not avoided, COULD RESULT in death or serious injury.

3. Caution

CAUTION: Indicates a POTENTIALLY HAZARDOUS SITUATION! If not avoided, MAY RESULT in minor or moderate injury. It may also be used to alert against unsafe practices.

4. Notice

NOTICE: Indicates information or procedures that are considered important but not hazard related. If not followed, property damage could result.

5. Important

IMPORTANT: Indicates general reference information worthy of special attention.

SAFETY DECALS

The safety decals on your machine are visual reminders of the important safety information in this manual. All messages on your unit must be fully understood and carefully followed. Safety decals on the machine are explained below.

Always replace missing or damaged safety decals. Replacement decal information is in the parts manual for your machine. Decals can be ordered from your dealer.

See Figure 1 for safety decal locations.

Safety Decal Locations

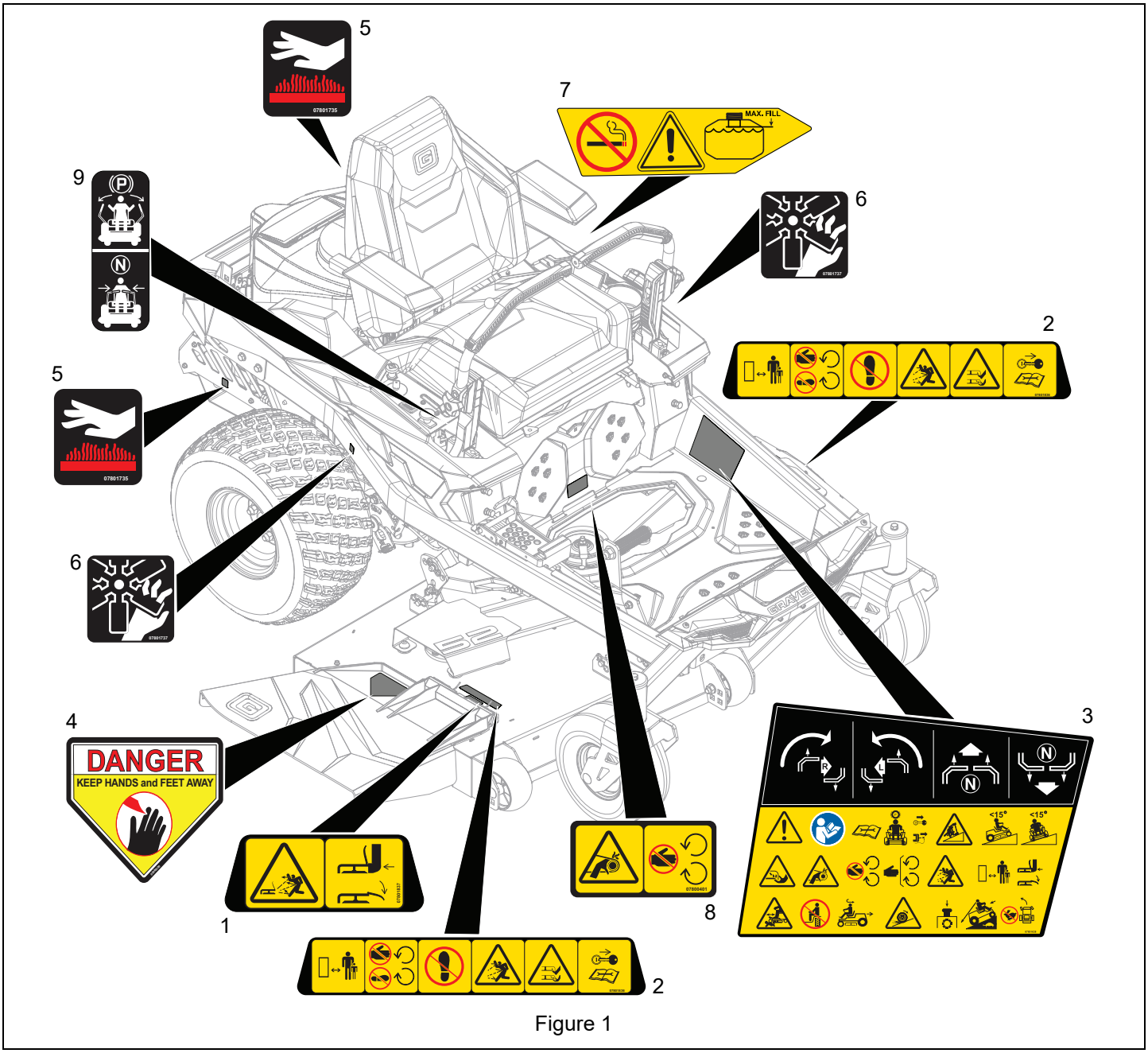
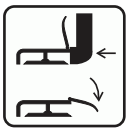


Figure 1

Safety Decal Descriptions

1. DANGER!

Discharge Hazard - NEVER operate unit without discharge chute in operating position. Thrown objects can cause injury or damage.



DO NOT operate mower unless all guards are in operating position or bagger is attached.

2. DANGER!

Discharge Hazard - NEVER direct discharge toward people, pets or property. Thrown objects can cause injury or damage.

Amputation Hazard - NEVER stick hands or feet under deck or shielded areas.

Shut off engine, remove key and read manual before servicing or making adjustments to unit.

Keep children and others away from unit while unit is in operation.

Keep feet and hands away from all rotating or moving parts.

DO NOT step or stand in this area.

3. DANGER!

DANGER!

Read and understand the operator's manual before operating unit.

3. AMPUTATION HAZARD

To avoid amputation hazard DO NOT put hands near rotating blades.

To avoid amputation hazard DO NOT put hands near moving belts.

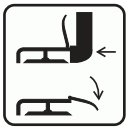
Keep hands away from all rotating or moving parts.

Keep all guards and shields in place.

3. DISCHARGE HAZARD

Discharge Hazard - NEVER direct discharge toward people, pets or property. Thrown objects can cause injury or damage.

Keep children and others away from unit while unit is in operation.



DO NOT operate mower unless all guards are in operating position or bagger is attached.

3. TIPPING HAZARD

Avoid tipping hazard.

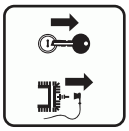
DO NOT operate on slopes over 15°.

DO NOT operate on slopes over 15°.

3. SERVICE HAZARD

Read owner's manual before servicing or making adjustments to unit.

Set parking brake.



Remove key and disconnect spark plug before servicing or making adjustments to unit.

3. BYSTANDER HAZARD

DO NOT operate the unit in the presence of bystanders.

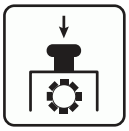
Keep people away from unit while operating. Keep children out of work area and under watchful care of a responsible adult.

DO NOT carry passengers.

Look behind when operating the unit in reverse.

3. LOSS OF TRACTION HAZARD

If loss of traction is experienced do the following:



Disengage PTO.

Proceed off slope slowly.

DO NOT try to turn or speed up.

4. DANGER!

ALWAYS keep hands and feet away from discharge chute.

5. HOT PARTS!

DO NOT touch parts which are hot from operation. ALWAYS allow parts to cool.

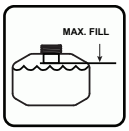
6. ROTATING PARTS!

AVOID INJURY. Stay clear of rotating parts.

7. DANGER!

DANGER!

No smoking.



IMPORTANT: DO NOT overfill. Fill fuel tank to below bottom of filler neck.

WARNING: Overfilling may cause severe damage to evaporative system!

- NEVER fill fuel tank when engine is running, hot or unit is indoors. NEVER overfill fuel tank.
- Replace fuel cap securely and clean up spilled fuel.

8. AMPUTATION HAZARD

To avoid amputation hazard DO NOT put hands near moving belts.

Keep hands away from all rotating or moving parts.

9. IMPORTANT

IMPORTANT: Steering controls

SAFETY INSTRUCTIONS

The following safety instructions are based on the B71.1 specifications of the American National Standards Institute and ISO 5395 in effect at the time of production.

Safe Practices for Ride-On Mowers

If used improperly, this machine is capable of amputating hands and feet and throwing objects. Failure to observe the following safety instructions could result in serious injury or death. Use only for purposes intended as set forth in the Operator's Manual. Other use is improper and may cause serious injury or death.

General Information

Read, understand, and follow instructions and warnings in this manual and on the machine, engine and attachments.

Only allow operators who are responsible, trained, familiar with the instructions, and physically capable to operate the machine.

DO NOT carry passengers and keep people or pets away from the mowing area.

DO NOT operate the machine while physically or mentally impaired, feeling tired, ill or under the influence of alcohol or drugs.

Follow the manufacturer's recommendation for wheel weights or counterweights.

DO NOT touch parts which are hot. Allow parts to cool.

Preparation Before Operating

Inspect unit before each use for missing or damaged decals and shields, correctly operating safety interlock system, ROPS and deterioration of grass catchers. Replace or repair as needed.

Clear the operating area of all objects which could be thrown by or interfere with operation of the machine.

Keep the area of operation clear of all bystanders, particularly small children. Stop the machine and attachment(s) if anyone enters the area.

DO NOT operate the machine without the entire grass catcher, discharge chute, or other safety devices in place and functioning properly. Check frequently for signs of damage, wear or deterioration and replace as needed.

NEVER tamper with safety devices. Check their proper operation regularly. NEVER do anything to interfere with the intended function of a safety device or to reduce the protection provided by the safety device.

Check parking brake operation frequently. Adjust and service as required.

Wear appropriate personal protective equipment such as safety glasses, hearing protection, and substantial footwear. DO NOT mow barefoot or while wearing sandals.

Operating

Improper use of power equipment can cause serious permanent injury or death to the operator or a bystander. Understand:

- How to operate all controls
- The functions of all controls
- How to STOP in an emergency
- Braking and steering characteristics
- Turning radius and clearances

If the operator or the mechanic cannot read the manual, it is the owner's responsibility to explain it to them. Manuals are available in other languages at www.gravely.com.

Only run the engine in well ventilated areas. Exhaust gases contain carbon monoxide, an odorless deadly poison.

Only operate the machine in daylight or good artificial light.

Avoid holes, ruts, bumps, rocks and other hazards. Uneven terrain could overturn the machine, or cause operator to lose their balance, footing and/or control of the mower.

DO NOT put hands or feet near rotating parts or under the machine. Keep clear of the discharge opening at all times.

Avoid slippery surfaces. ALWAYS be sure of your footing.

Stop engine before removing grass catcher or unclogging chute.

DO NOT direct discharge material toward anyone. Avoid discharging material against a wall or obstruction. Material may ricochet back toward the operator. Stop the blade(s) when crossing gravel surfaces. DO NOT mow into roads or across sidewalks.

DO NOT leave a running machine unattended. ALWAYS park on level ground, disengage the attachment, set parking brake, stop engine and remove key (if applicable) before leaving the operator's position.

DO NOT mow in reverse unless absolutely necessary. ALWAYS look down and behind before and while backing.

Lightning can cause severe injury or death. If lightning is seen or thunder is heard in the area, DO NOT operate the machine; seek shelter.

If you strike a foreign object, stop and inspect the machine. Repair, if necessary, before restarting.

ALWAYS check overhead and side clearances carefully before operation. Keep in mind that your mower deck may be wider than your track width.

Children Specific

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the machine and the mowing activity. NEVER assume that children will remain where you last saw them.

Keep children out of the operating area and under the watchful care of a responsible adult other than the operator.

Do not carry children, even with the blade(s) shut off. Children could fall off and be seriously injured or interfere with safe machine operation. Children who have been given rides in the past could suddenly appear in the mowing area for another ride and be run over or backed over.

DO NOT allow children under the age of 18 to operate any outdoor power equipment.

Slope Specific

Slopes are a major factor related to accidents. Operation on slopes requires extra caution. If you feel uneasy on a slope DO NOT mow it. Use the parking brake for emergency stops.

DO NOT operate on slopes of more than 15°.

Do not mow within 1.2 M (4 feet) of a drop off. Do not mow within 1.2 M (4 feet) of a pond or other waterway.

The primary hazard of slope operation is loss of control and/or roll over.

Mow up and down slopes, NEVER across slopes of more than 15°. Exercise caution when changing direction on slopes. Use caution while operating near dropoffs.

Avoid mowing wet grass. Wet surfaces can cause a loss of traction and control.

DO NOT operate machine under any condition where traction, steering, or stability is in question. Tires could slide even if the wheels are stopped.

Always keep the machine in gear when going down slopes. Do not coast downhill.

Avoid starting and stopping on slopes. Avoid making sudden changes in speed or direction. Make turns slowly and gradually.

Use extra care while operating machine with a grass catcher or other attachment(s). They can affect the stability of the machine.

Fire and Fuel Specific

Extinguish all cigarettes, cigars, pipes and other sources of ignition.

Use only an approved fuel container.

DO NOT remove fuel cap or add fuel with the engine running or while hot.

DO NOT refuel indoors or in enclosed spaces.

DO NOT store the machine or fuel container, or refuel, where there is an open flame, spark, or pilot light such as on a water heater or other appliance.

If fuel is spilled, DO NOT attempt to start the engine and avoid creating any source of ignition until fuel vapors have dissipated.

To help prevent fires: keep machine free of grass, leaves, or other debris build up; clean up oil or fuel spillage and remove any fuel soaked debris; allow engine to cool before storing.

Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.

Hauling

Use a single full-width ramp for loading and unloading a machine for transport. Secure with appropriate straps.

Towing

Follow the manufacturer’s recommendation for weight limits for towed equipment and towing on slopes.

ROPS (If Equipped)

The ROPS is an integral safety device. Do not remove or alter the ROPS.

Keep a folding ROPS in the raised and locked position and use the seat belt when operating the machine.

Lower a folding ROPS temporarily only when absolutely necessary. Do not wear the seat belt when folded down. There is no rollover protection when a folding ROPS is in the down position.

Frequently inspect the ROPS and the seatbelt for damage. Replace a damaged ROPS. Do not repair or alter.

Service

Keep machine in good working order. Replace worn or damaged parts.

Use caution when servicing or sharpening blades. Wrap the blade(s) or wear gloves. Replace damaged blades. Do not repair or alter blades.

Disconnect spark plug wire(s) and the negative battery cable before making any repairs.

Use only attachments recommended by Gravely that are appropriate to your use and can be used safely in your application.

The use of non-genuine replacement parts or accessories could adversely affect machine operation and safety.

DO NOT change engine governor setting or overspeed the engine.

INTRODUCTION

MANUAL INFORMATION

IMPORTANT: The information contained in this service manual is intended for technicians with the required expertise, training and correct equipment. Perform the procedures in the manual while safeguarding machine performance and safety. Gravely is under no circumstances liable for any damage or injuries, due to service performed by private individuals or inadequate facilities.

This manual does not cover in-depth service and repair work on the engine and transmission units. Refer to Engine Manual.

Read this manual in full to acquire a basic understanding of the unit before performing any service procedures.

Seated Operator References

When reference is made to a position on the machine “front”, “back”, “left”, or “right” side, this refers to the perspective of the seated operator. See Figure 2.

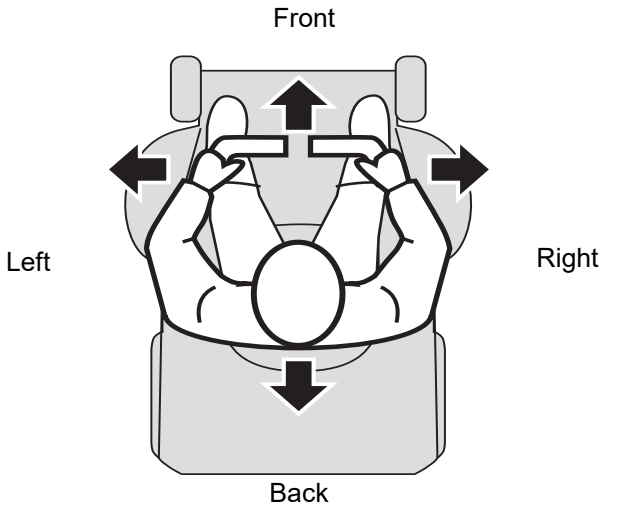


Figure 2

OPERATION INFORMATION

Operator Qualification

All maintenance, disassembly and repairs must be carried out by trained professional technicians who are familiar with the machine, accident prevention and safety regulations.

Safety Checks Before Operation

All machines are manufactured in accordance with strict safety regulations and guidelines. Always follow these safety regulations and guidelines to ensure a safe work environment.

Before performing any work, always make these checks:

- The safety switches function correctly.
- The guards and protection covers have not been removed.
- Restore or repair any safety devices which have been manipulated or removed.
- damaged or missing guards and protection covers.
- Replace missing or damaged decals.
- Do not make repairs or modifications to the machine or the engine that change the original design or performance.

SERVICE INFORMATION

Service Preparation

Before starting any work, provide adequate preparation and a clean working area. A clean working area at the beginning of each procedure makes for a safer work environment.

Always place the parts removed on a clean work surface, with all the parts arranged in order of assembly.

Organization is important for correct reassembly. Prepare required tools and components before starting work.

Service Precautions

Avoid hazardous situations related to mechanical operations by taking the necessary safety precautions while performing any work.

Follow basic safety rules:

- Remove the ignition key before beginning any repair work.
- Protect hands with protective gloves when working near the mower blades.
- Do not cause accidental fuel or oil leaks.
- Do not smoke when working on the tank or when handling fuel.
- Do not inhale fumes from oil or fuel.
- Clean up all oil and fuel spills immediately.
- Allow the engine and exhaust system to cool before starting any repair or maintenance work.
- Test the engine in a well ventilated area with adequate exhaust extraction system.
- Dispose of all oil and fuel waste in accordance with applicable laws and regulations.

SERVICE POSITION

See Figure 3.

Always ensure unit is in the service position before performing any maintenance.

1. Park unit on a flat, level surface and chock wheels so unit cannot roll.
2. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
3. Move steering levers to neutral position and rotate handles outward.
4. Engage parking brake.
5. Disconnect spark plug wires.
6. Tip seat forward.

IMPORTANT: Reconnect spark plug wires after maintenance.

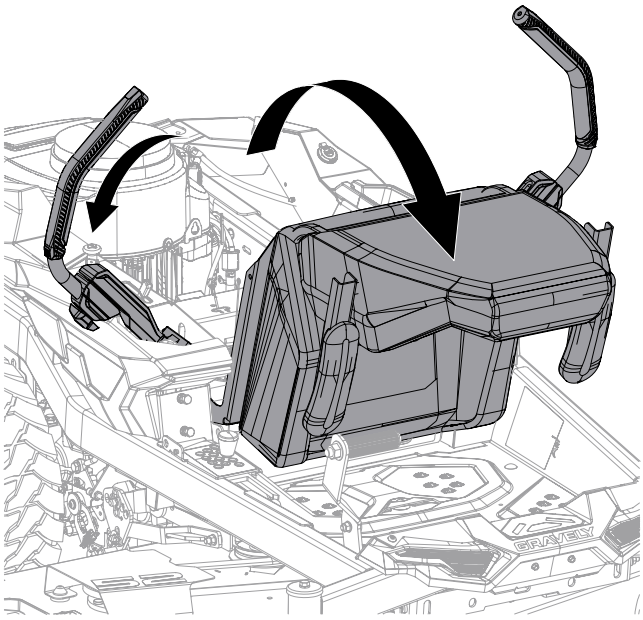


Figure 3

GENERAL INFORMATION

MACHINE AND COMPONENTS

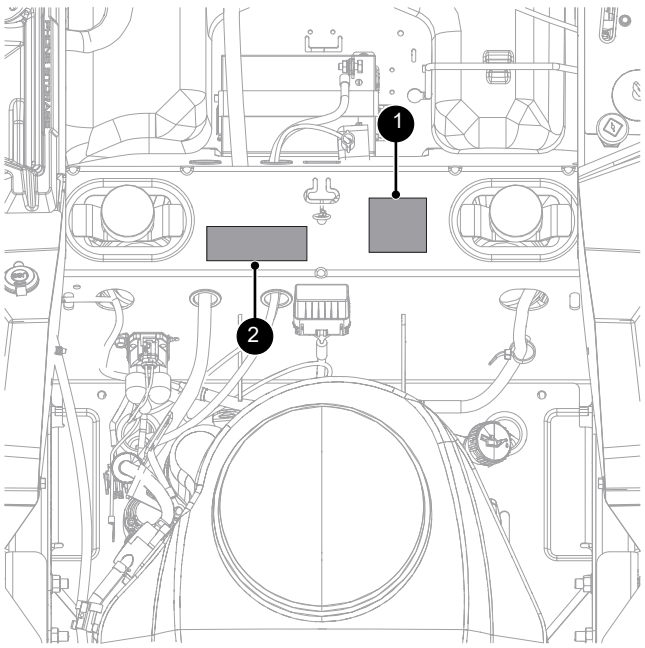
The purpose of this manual is to provide a complete set of instructions related to the servicing, maintenance, disassembly, repair and installation of mechanical components for ZT-X and ZT-XL models.

This manual must be used during all adjustment, disassembly and troubleshooting activities.

Machine Identification

Each machine has a model and serial number label. See Figure 4.

IMPORTANT: Always include model and serial numbers when requesting warranty or service parts.



1. Model & Serial Number Label
2. EPA Label

Figure 4

Engine Identification

The engine has a serial number that identifies the engine and its specifications. See Figure 5.

IMPORTANT: Always have serial number available when requesting replacement parts or information from manufacturer.

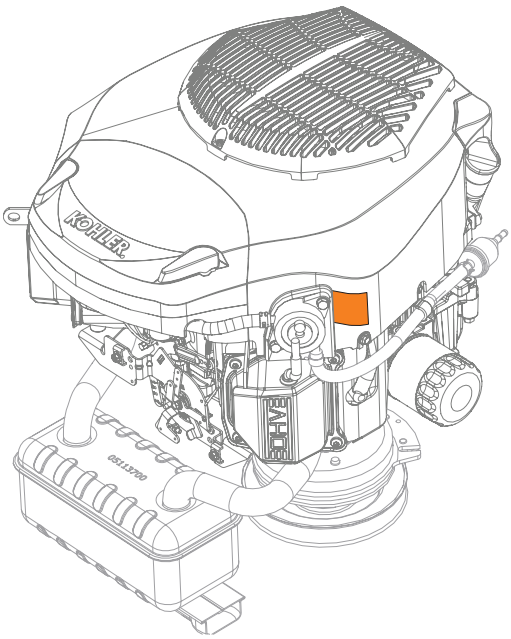


Figure 5

Transmission Identification

The machine is equipped with two transaxles.

Each transaxle has a serial number label. See Figure 6.

IMPORTANT: Always have serial number available when requesting replacement parts or information from manufacturer.

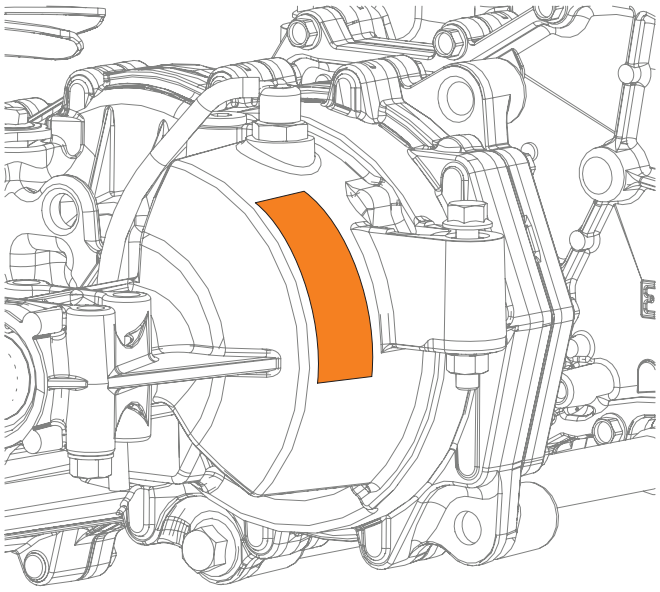


Figure 6

REQUIRED EQUIPMENT

Basic Equipment

All operations can be performed with standard tools. Use an adequate lifting platform that supports machine weight and dimensions. Lifting platform allows access to lower parts of machine.

Some basic standard tools and test equipment are needed for repair work.

Standard tools:

- Needle-nose or long pliers to connect or bend wires and connectors in tight positions
- Diagonal cutters to cut wires or trim connections
- Wire strippers to strip insulation from wires
- Crimping tools to crimp terminals, connectors and wires
- Soldering irons and soldering guns to weld couplings and connections to terminals, connectors, etc.
- Multimeters, analog or digital, to measure voltage, amperage and ohms
- Tachometers to measure engine speed and to test alternator and charging circuits where output is dependent upon engine speed
- Heat guns to shrink insulated tubing in place and to replace electrical tape or insulated sleeving
- Medium grade grinder for sharpening blades

Consumable materials:

- Electrical tape
- Resin-core solder
- Various sized terminals
- Connectors
- Insulated or heat shrink tubing
- Assortment of automotive type wire (in several colors)

WARNING: AVOID INJURY. Never use acid or acid core solder on electrical connections.

IMPORTANT: Gravely highly recommends all maintenance be performed in a professional manner. Use of tubing to cover connections and soldering connections is recommended, and more likely to withstand vibration.

IMPORTANT: Replace all faulty components with certified replacement parts only. Engine parts, such as rectifiers or alternator components should be repaired by a reliable engine service dealer.

Special Equipment

See Figure 7.

The following tools are recommended when checking alignment and balance of blades:

- Leveling gauge to measure height from ground
- Floor jack
- Blade balancer for testing blades for balance

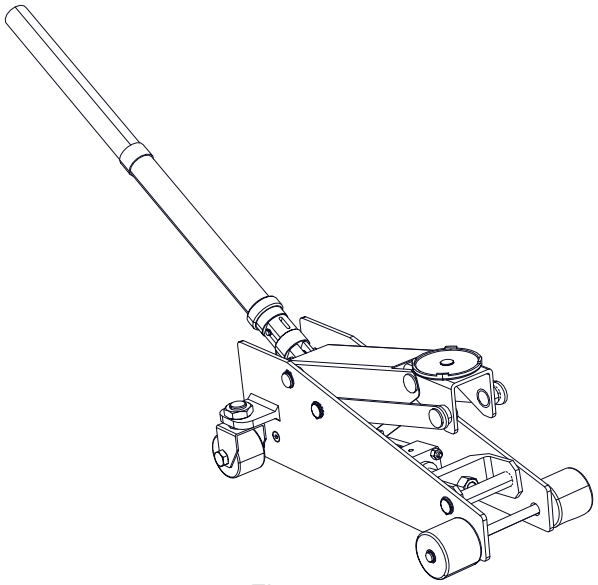


Figure 7

Standard Tools and Torque Wrenches

Fasteners and hardware used on this machine are measured in inches, but some hardware on engine and transmission may be metric. All measurements within procedures are listed in both metric and standard U.S. scales.

Always use appropriate wrenches and sockets when performing procedures and especially when applying torque. Using metric tools on standard U.S. hardware can damage hardware.

Table shows measurements of screws and nuts used on machine. Correct wrench size and torque limits are shown for these torque applications:

- Standard torque
- Torque for heavy loads

NOTICE: Torque limits are listed in manual for specific procedures.

TRANSPORTATION AND HANDLING

Machine Transportation

Pay attention when loading or unloading machine onto a trailer or truck.

- When loading machine on trailer or vehicle, raise deck completely to prevent deck from catching. Lower deck once machine is loaded.
- DO NOT transport machine with deck in the raised position.
- Use frame to secure the machine while transporting.
- NEVER secure using machine rods or linkages that can be damaged.
- Engage park brake during transportation.
- Remove key from ignition during transportation.

Front Lifting

Engage parking brake to secure rear wheels and help prevent tractor / frame movement.

See Figures 8 – 10.

1. Position a floor jack under front axle.

NOTICE: Jack stands must be under frame, not bumper.

2. Lift front axle and insert two jack stands under frame.

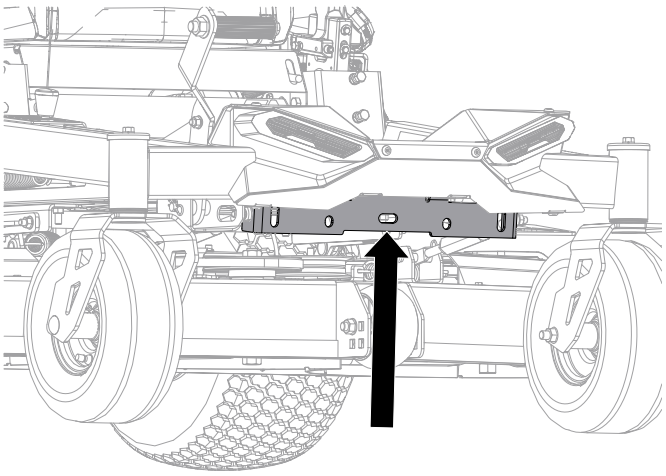


Figure 8

Floor Jack

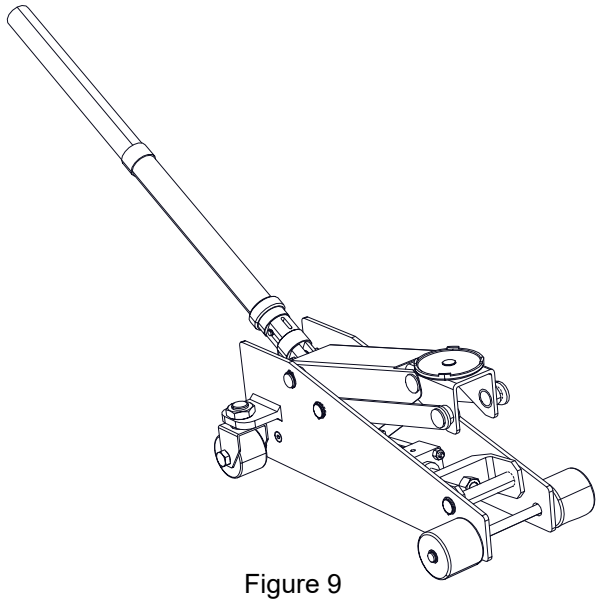


Figure 9

Jack Stand

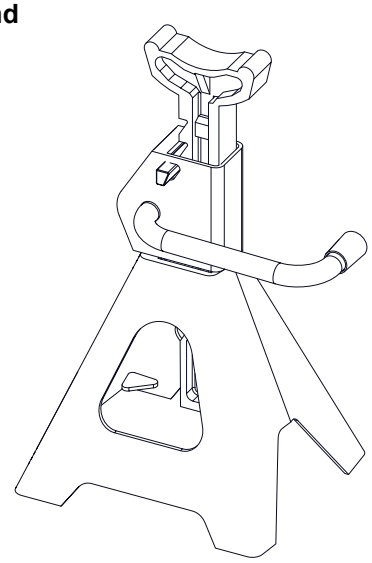


Figure 10

WARNING: AVOID INJURY. Release floor jack and ensure tractor / frame is stable before starting any work.

SAFETY DEVICES

Keep safety systems of machine in efficient working order. Perform regular safety system checks to ensure proper function.

Safety system includes:

- Safety Decals
  Decals are considered an integral part of the safety system. Always replace illegible or missing decals.
- Electric Safety Devices
  Always check operation of safety switches, simulating various situations during normal operations by performing the tests in Table 1.

Table 1: Safety Interlock System

Test	Steering Levers	PTO	Parking Brake	Result
Starting Interlock				
1	Neutral	Off	On	Engine starts.
2	Forward, Neutral, Reverse	On	On or Off	Engine does not start.
3	Forward, Neutral, Reverse	On or Off	Off	Engine does not start.

Table 1: Safety Interlock System

Operating Interlock (Engine On)				
4 *	Forward, Neutral, Reverse	On	On or Off	Engine shuts off.
5 *	Forward, Neutral, Reverse	On or Off	Off	Engine shuts off.
* When operator lifts off seat.				

SAFETY DEVICE OPERATION

When required operating conditions are not met, engine safety devices activate, preventing ignition and stopping unit.

Tables 2 and 3 show safety device effects on engine in all possible situations.

Engine starts when these conditions are met:

Table 2: Engine Starting

Parking Brake	Operator	PTO Blade Control
Engaged (ON)	Seated	Disengaged (OFF)
Engaged (ON)	None	Disengaged (OFF)

Effects on engine during operating conditions:

Table 3: Operating Conditions

Parking Brake	Operator	PTO Blade Control	Effect on Engine
Engaged (ON)	Seated	Engaged (ON)	Keeps running
Engaged (ON)	Seated	Disengaged (OFF)	Keeps running
Engaged (ON)	None	Engaged (ON)	Stops
Engaged (ON)	None	Disengaged (OFF)	Keeps running
Disengaged (OFF)	Seated	Engaged (ON)	Keeps running
Disengaged (OFF)	Seated	Disengaged (OFF)	Keeps running
Disengaged (OFF)	None	Engaged (ON)	Stops
Disengaged (OFF)	None	Disengaged (OFF)	Stops

LUBRICATION

ENGINE

Check Engine Oil

See Figure 11. Kohler shown, Kawasaki similar.

NOTICE: Maintain correct engine oil level or engine damage may occur. Refer to Engine Manual.

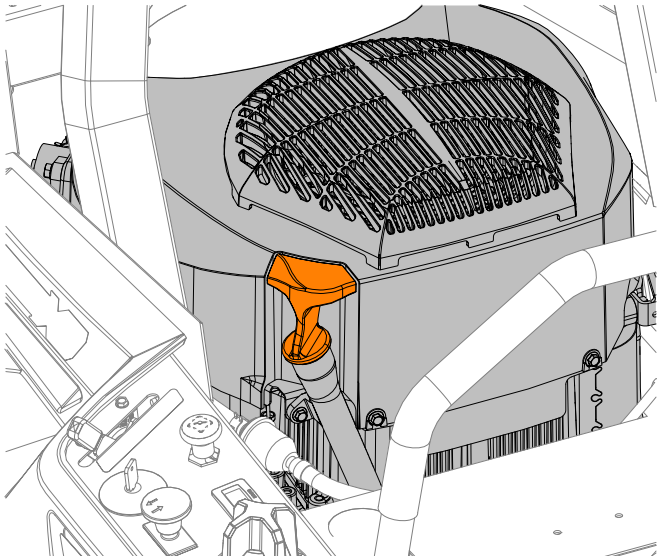


Figure 11

GREASE FITTINGS

NOTICE: Use Ariens Red Grease Part Number 00036700 or equivalent to avoid damage to components and unnecessary wear.

Grease fittings are located on both front wheels.

1. Lubricate grease fittings on front wheels. See Figure 12.

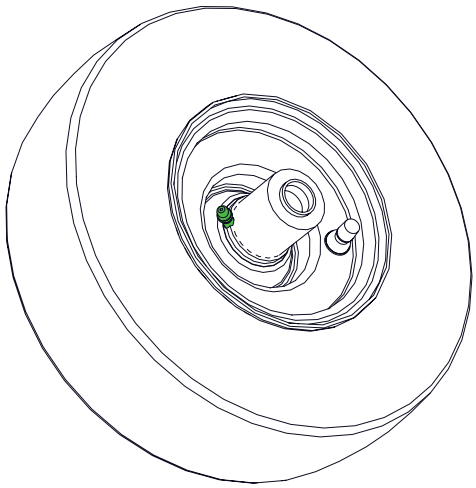


Figure 12

BODY

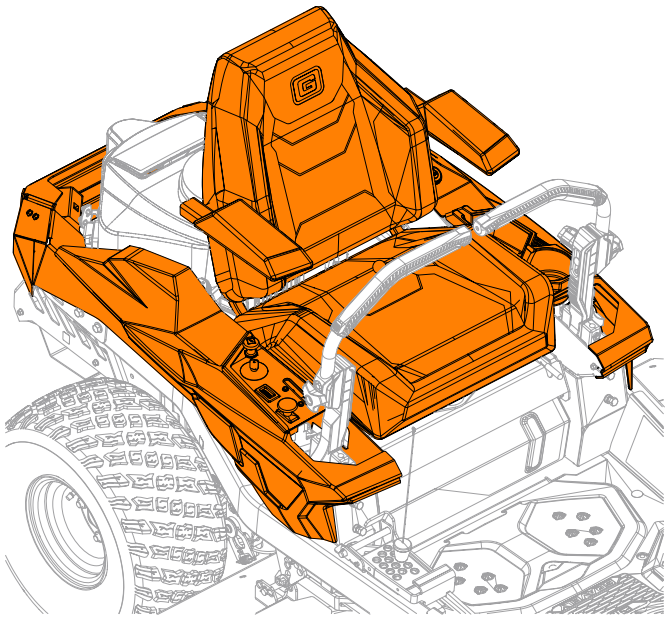


Figure 13

FENDER REPLACEMENT

Remove Left Fender

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove USB port and cupholder from left fender. See Figure 14.

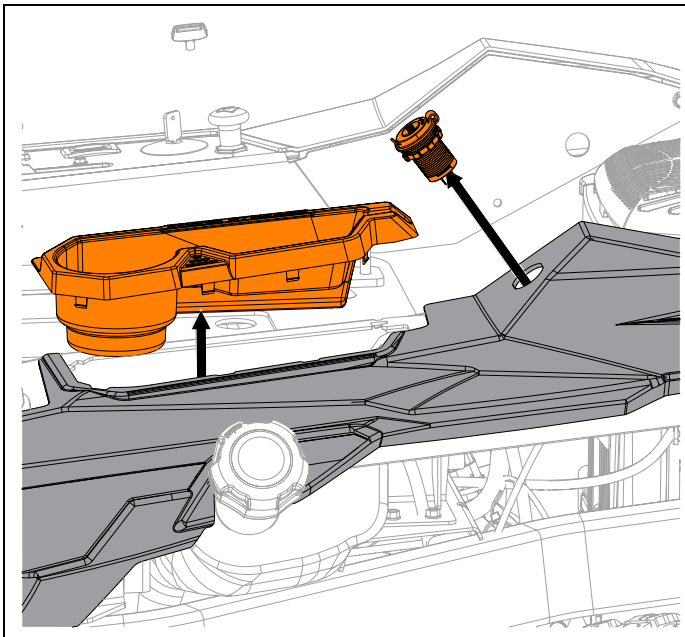


Figure 14

3. Remove four tapping screws from left fender. See Figure 15.

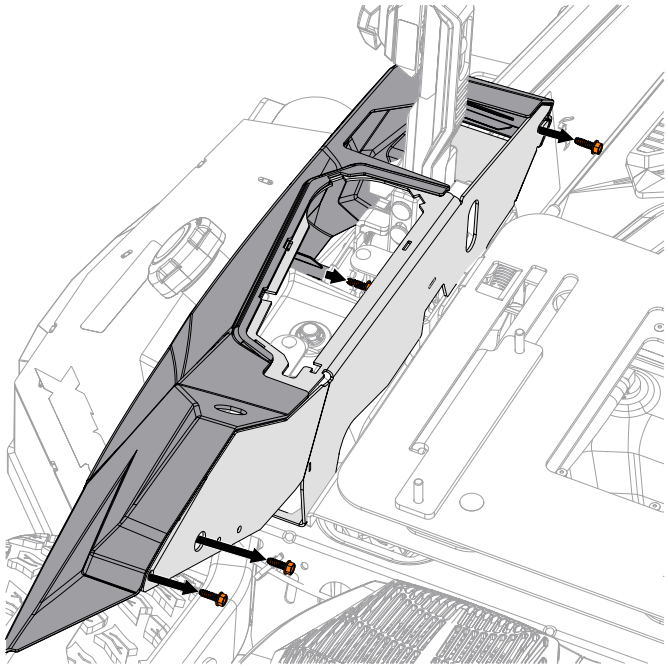


Figure 15

4. Remove fender. See Figure 16.

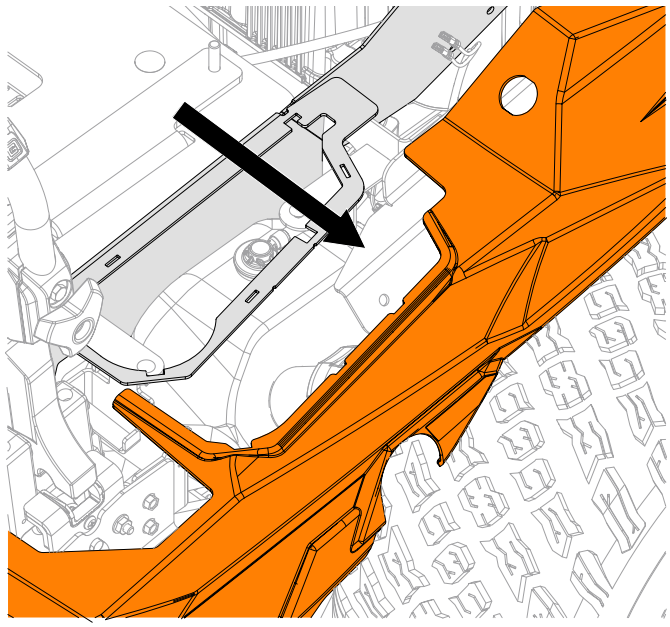


Figure 16

Install Left Fender

1. Reinstall fender and secure with previously removed hardware. See Figure 15.
2. Reinstall cupholder and USB port. See Figure 14.
3. Return unit to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

Remove Right Fender

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove 1 tapping screw from front of right fender. See Figure 17.

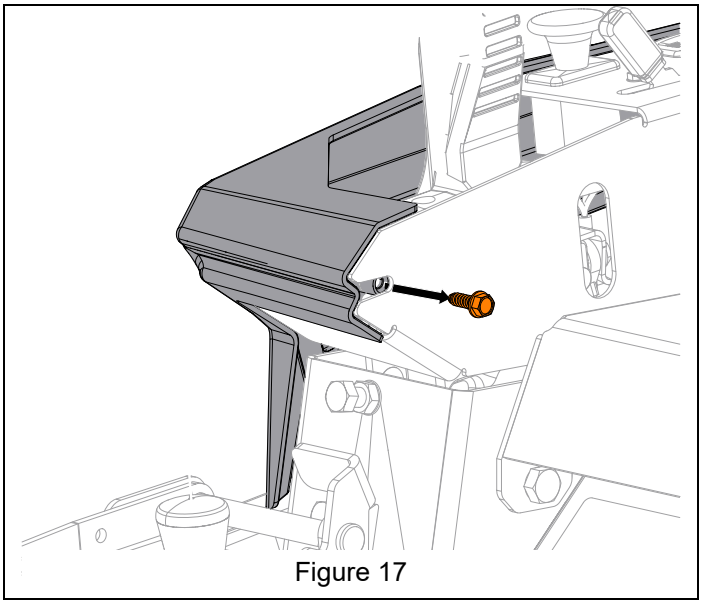


Figure 17

See Figure 18.

3. Remove two tapping screws from back of right fender and remove fender. See Figure 18.

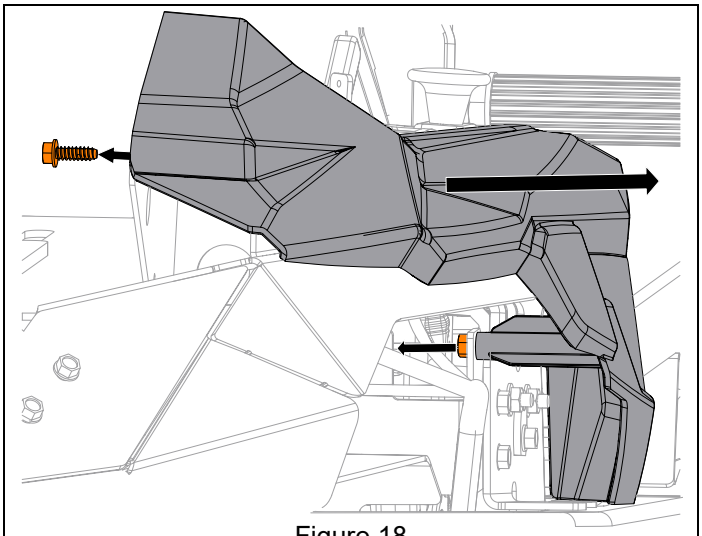


Figure 18

Install Right Fender

1. Reinstall fender and secure with tapping screws. See Figure 18.
2. Return unit to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

SEAT AND / OR SEAT PLATE REPLACEMENT

Remove Seat Assembly

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Disconnect wire harness from seat switch.
3. Remove and retain two hex bolts and two nyloc flange nuts from seat plate. Disconnect tether. See Figure 19.

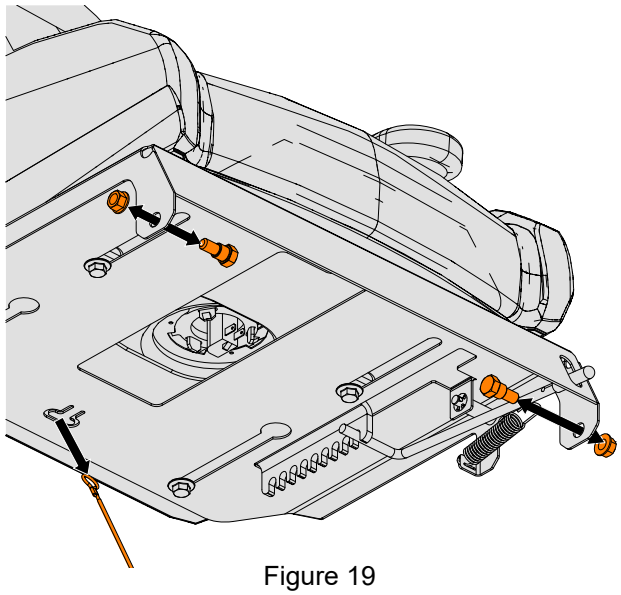


Figure 19

4. Remove seat assembly.

Install Seat Assembly

See Figure 22.

1. Reinstall seat assembly.
2. Reconnect seat plate and tether with hardware removed previously. See Figure 20.

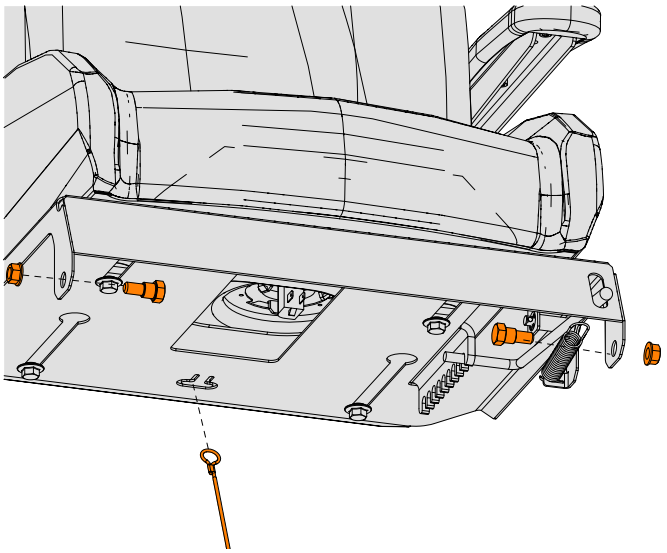


Figure 20

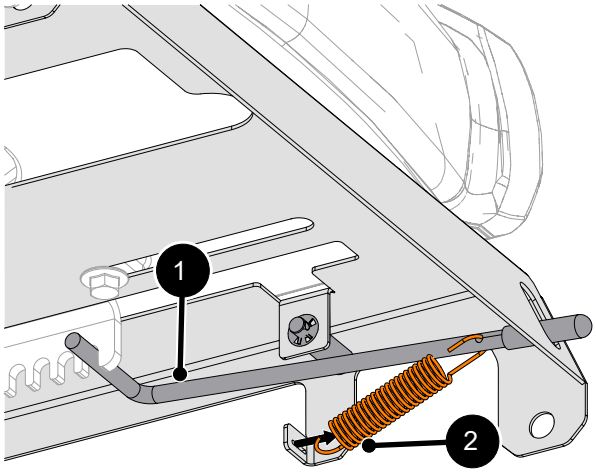
3. Reconnect wire harness.
4. Return seat to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

Remove Seat Latch Lever

IMPORTANT: Save all parts and hardware for reinstallation.

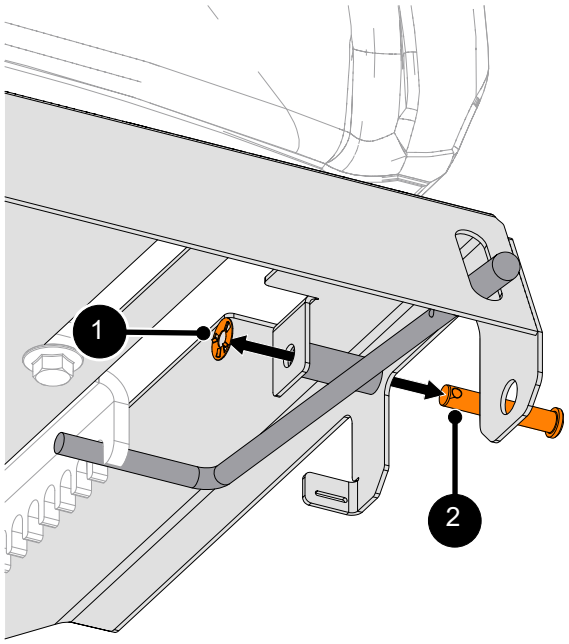
1. Place unit in service position. See *Service Position* on page 10.
2. Remove seat from unit. See *Remove Seat Assembly* on page 16.
3. *If included:*Remove seat isolator. See *Remove Seat Isolator* on page 17.
4. Remove extension spring connecting seat plate to seat latch lever. See Figure 21.



1. Adjustable Seat Latch Lever
2. Extension Spring

Figure 21

5. Remove and discard push nut. Remove pin and seat latch lever. See Figure 22.



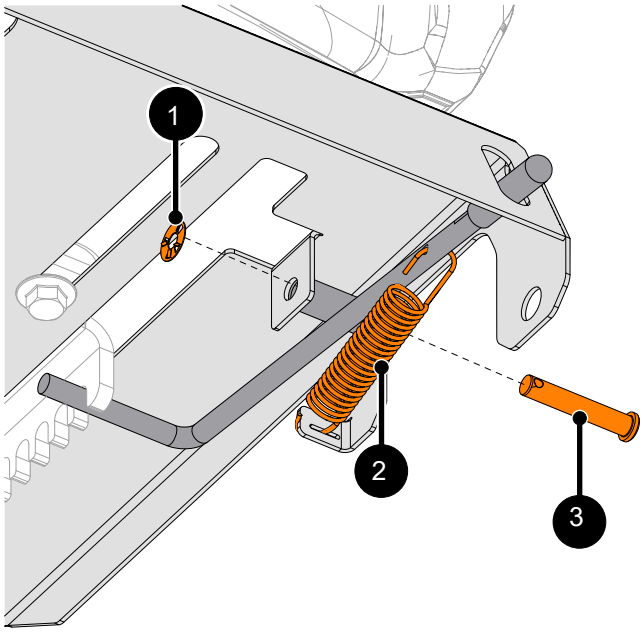
1. Push Nut
2. Seat pin

Figure 22

Install Seat Latch Lever

See Figure 23.

1. Install adjustable seat latch lever through seat plate and isolator plate, if included, and install push nut.
2. Install extension spring.



1. Push Nut
2. Extension Spring
3. Seat Pin

Figure 23

3. *If included:*Install seat isolator. See *Install Seat Isolator* on page 19.
4. Install seat. See *Install Seat Assembly* on page 16.
5. Return seat to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

Remove Seat Isolator

NOTICE: Seat isolator not included with all models.

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove seat from unit. See *Remove Seat Assembly* on page 16.

See Figure 24.

3. Remove six center locking flange nuts and three washers to remove isolator seat mount from seat.
4. Remove seat isolator mounting plate.

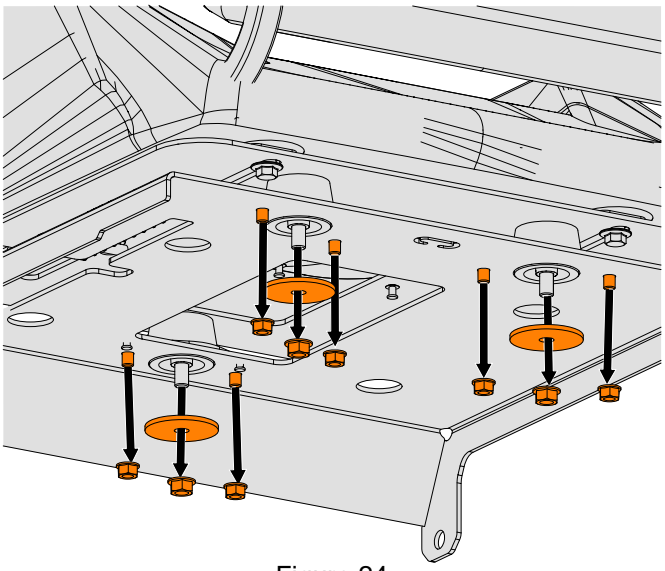
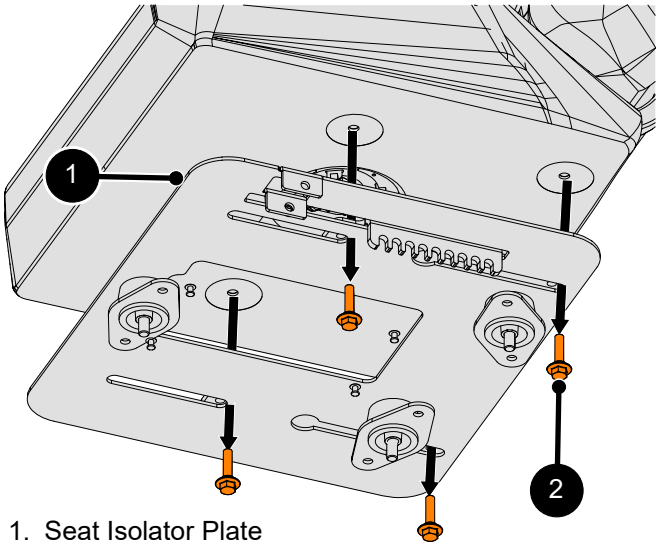


Figure 24

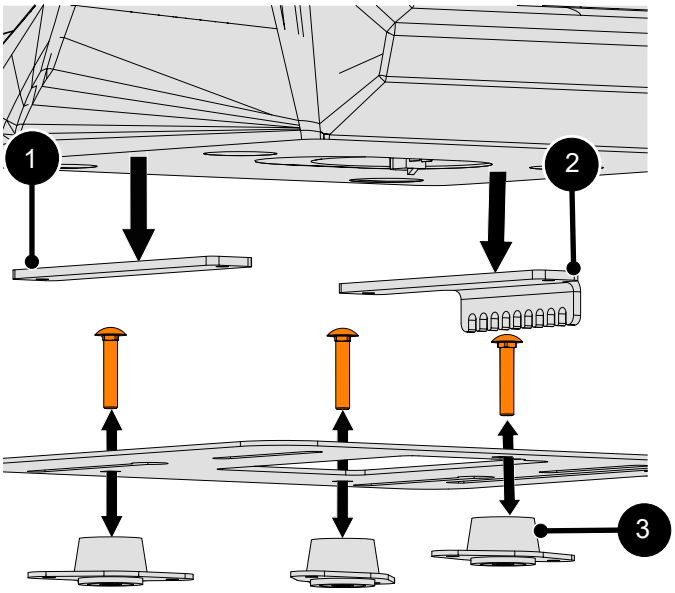
5. Remove four shoulder bolts to remove seat isolator plate. See Figure 25.



1. Seat Isolator Plate
2. Shoulder Bolts

Figure 25

6. Remove four raised head bolts to separate compression mounts from seat isolator plate. See Figure 26.



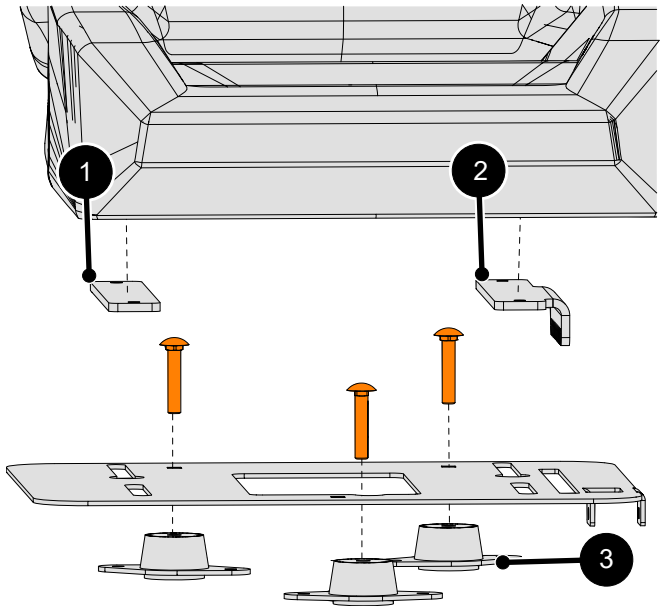
1. Spacer Plate
2. Seat Adjuster Plate
3. Compression Mounts

Figure 26

Install Seat Isolator

NOTICE: Seat isolator not included with all models.

1. Install compression mounts using hardware removed previously. Position spacer and adjustment plates. See Figure 27.



1. Spacer Plate
2. Seat Adjuster Plate
3. Compression Mounts

Figure 27

2. Install seat isolator plate using hardware removed previously. See Figure 28.

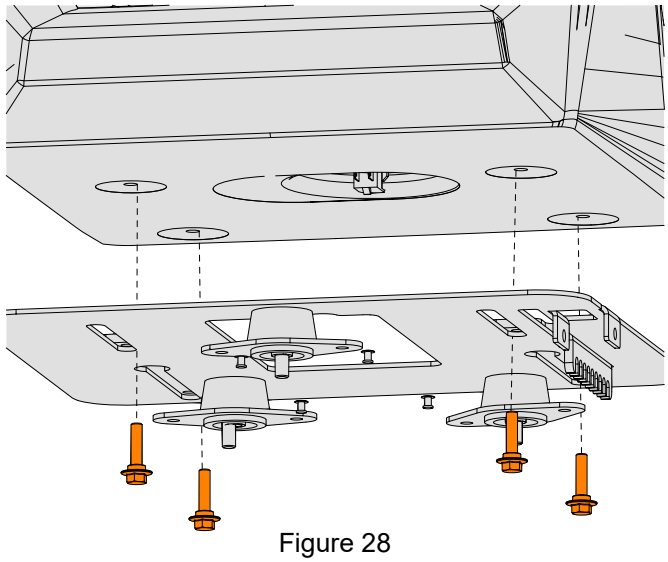


Figure 28

3. Install seat isolator mounting plate using hardware removed previously. See Figure 29.

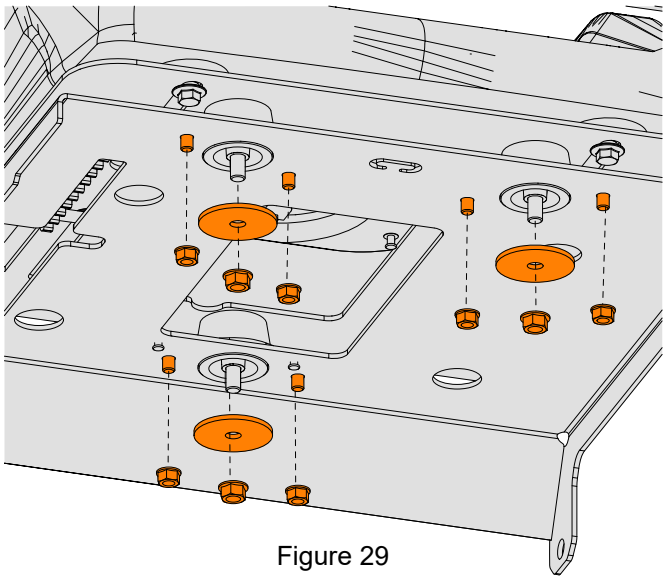


Figure 29

4. Install seat. See *Install Seat Assembly* on page 16.
5. Return seat to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

Remove Seat Plate

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove seat from unit. See *Remove Seat Assembly* on page 16.
3. *If included:* Remove seat isolator. See *Remove Seat Isolator* on page 17.
4. Remove seat latch lever. See *Remove Seat Latch Lever* on page 16.

5. Remove four shoulder bolts from seat plate. See Figure 30.

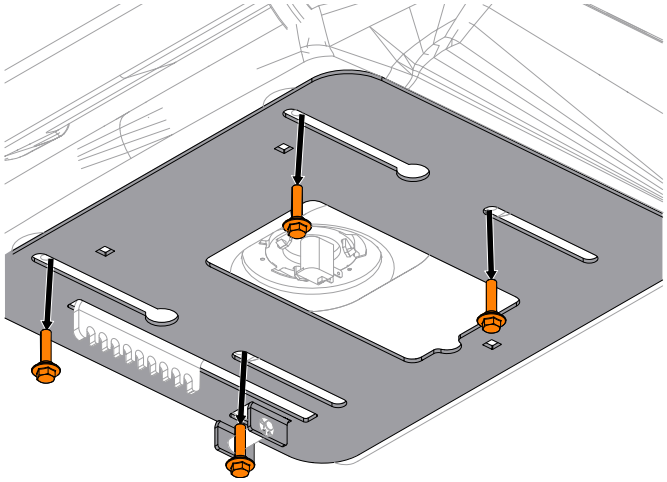
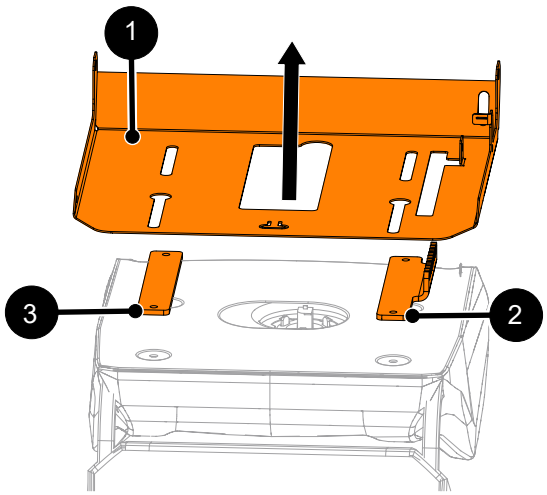


Figure 30

6. Remove seat plate, adjustable seat track plate and adjustable seat slide plate. See Figure 31.



1. Seat Plate
2. Adjustable Seat Track Plate
3. Adjustable Seat Slide Plate

Figure 31

Install Seat Plate

1. Reinstall adjustable seat track plate, adjustable seat slide plate and seat plate using shoulder bolts removed previously. See Figure 32.

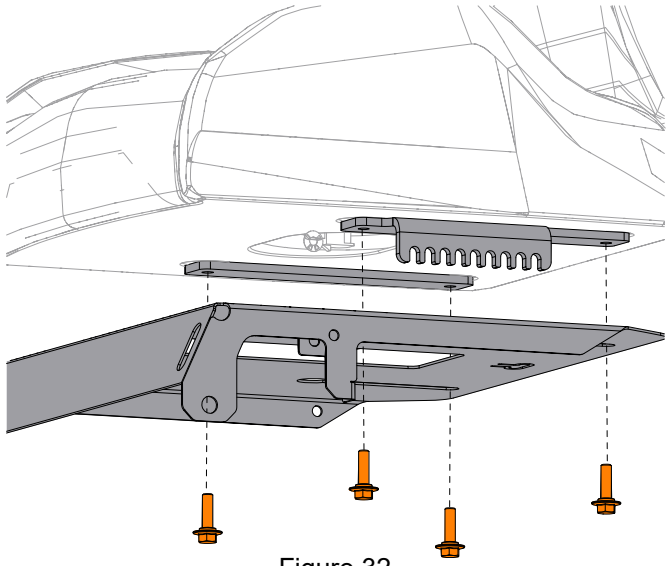


Figure 32

2. Reinstall seat latch lever. See *Install Seat Latch Lever* on page 17.
3. *If included:* Reinstall seat isolator. See *Install Seat Isolator* on page 19.
4. Reinstall seat. See *Install Seat Assembly* on page 16. Return seat to operation position.

CONTROL PANEL REPLACEMENT

Remove Control Panel

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

CAUTION: AVOID DAMAGE. DO NOT allow tools to contact metal surfaces when removing positive battery cable.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Remove right fender. See *Remove Right Fender* on page 15.

See Figure 33.

4. Disconnect ignition switch, choke control cable from engine, clutch and hour meter.
5. Remove two tapping screws retaining throttle control lever.

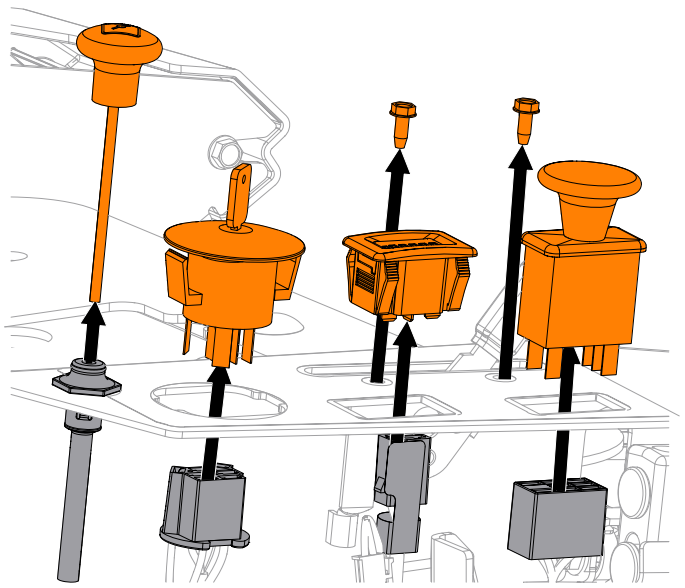


Figure 33

6. Remove three tapping screws retaining control panel and remove control panel. See Figure 34.

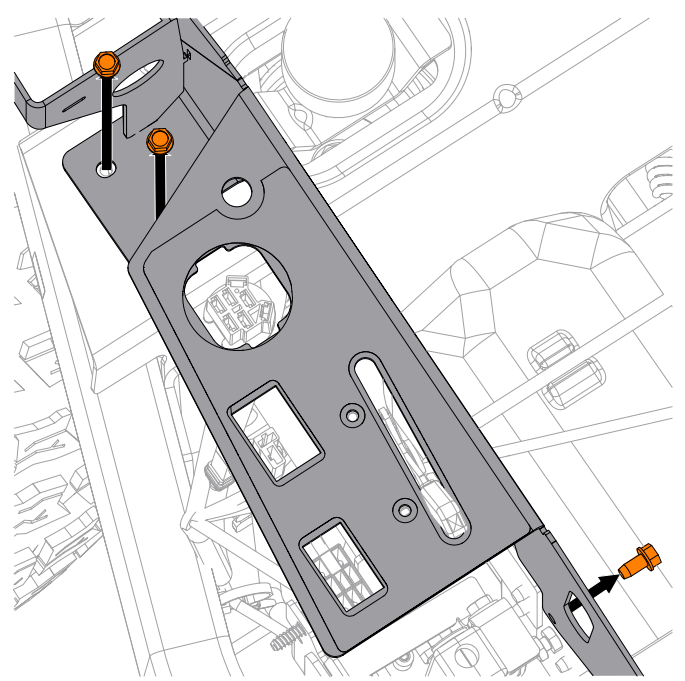


Figure 34

7. Remove two tapping screws securing throttle control lever. See Figure 35.

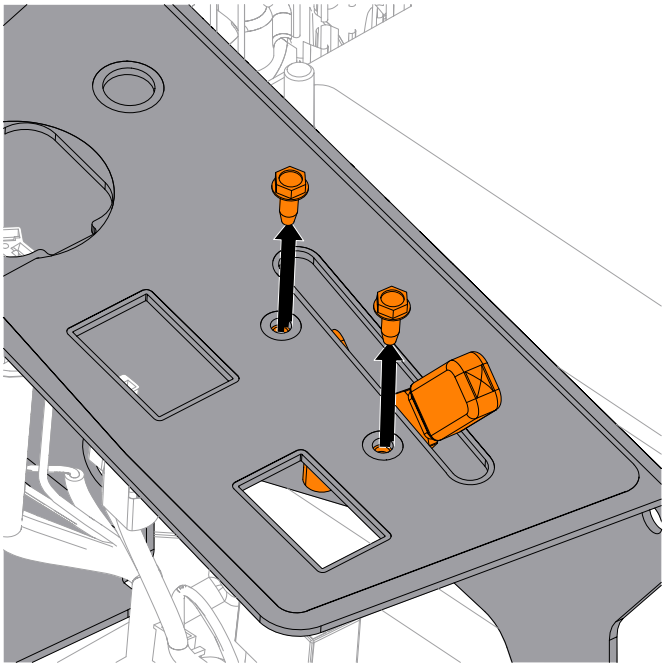


Figure 35

Install Control Panel

1. Reinstall control panel. Secure with three tapping screws removed previously. See Figure 36.

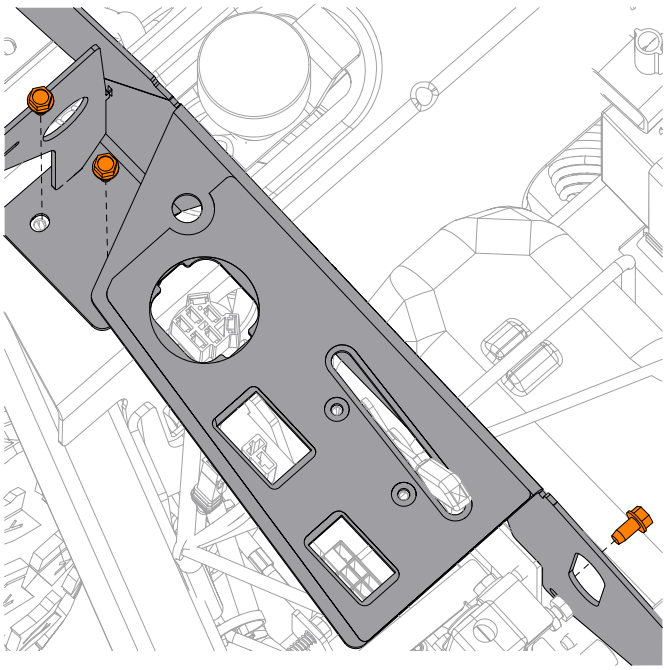


Figure 36

2. Reconnect ignition switch, choke control, power take-off (PTO switch) and hour meter.
3. Reattach throttle control lever with two tapping screws removed earlier.

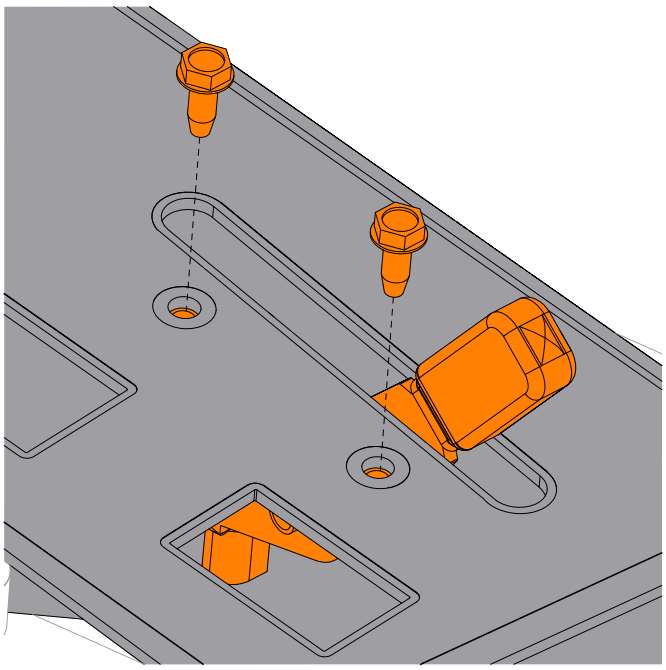


Figure 37

4. Reinstall right fender. See *Fender Replacement* on page 14.

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

5. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
6. Return unit to operating position.

HEADLIGHT REPLACEMENT

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

Remove Headlight

IMPORTANT: Save all parts and hardware for reinstallation.

1. Lift and support front of unit. Ensure jack stands are sturdy and capable of supporting unit. See *Front Lifting* on page 12.
2. Remove four machines screws to remove headlight assembly. See Figure 38.

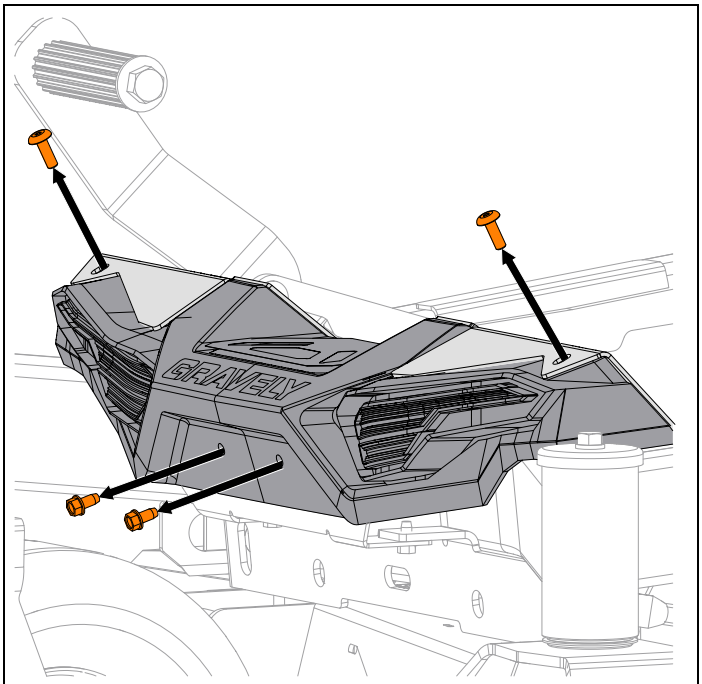


Figure 38

3. Remove one socket cap screw attaching headlight to bracket.See Figure 39.

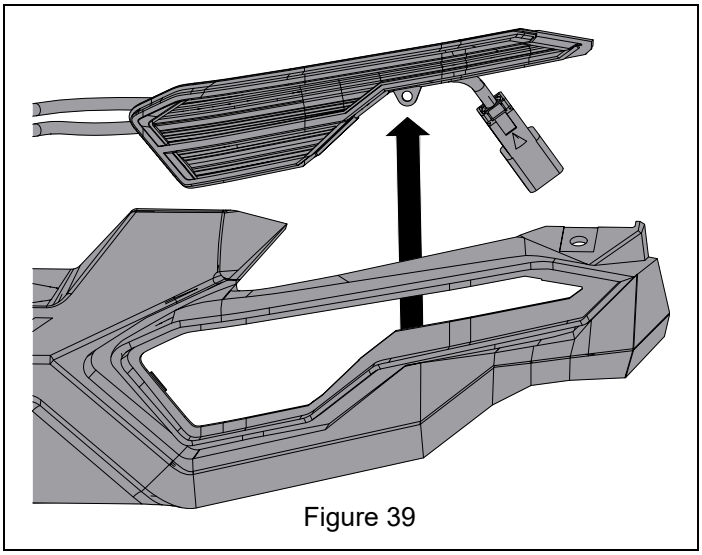


Figure 39

4. Disconnect headlight cable connectors from main wire harness. Note cable routing.
5. Remove headlight.

Install Headlight

1. Install new headlight on bracket and secure with one socket cap screw removed previously. See Figure 39.
2. Connect headlight cable connectors to main wire harness. Route cable properly.

Install headlight assembly using four machines screws removed previously. See Figure 38.

ENGINE

Kawasaki Model

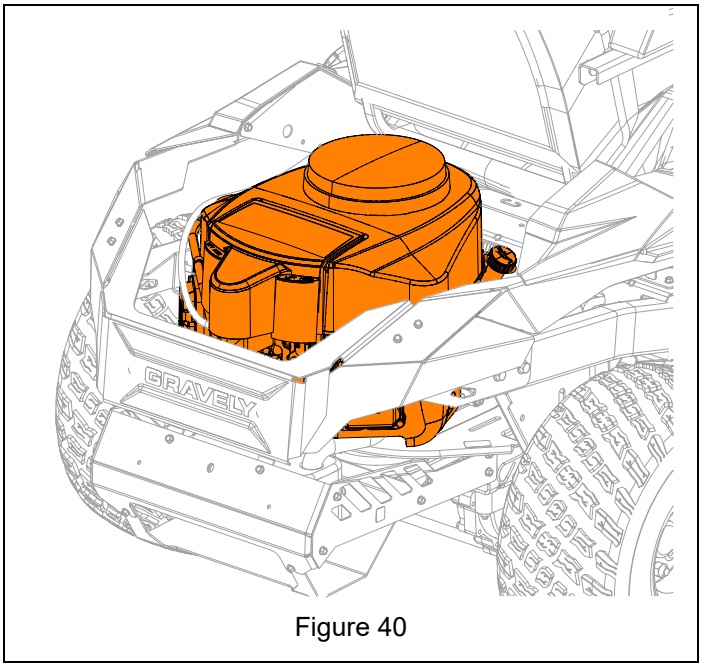


Figure 40

Kohler Model

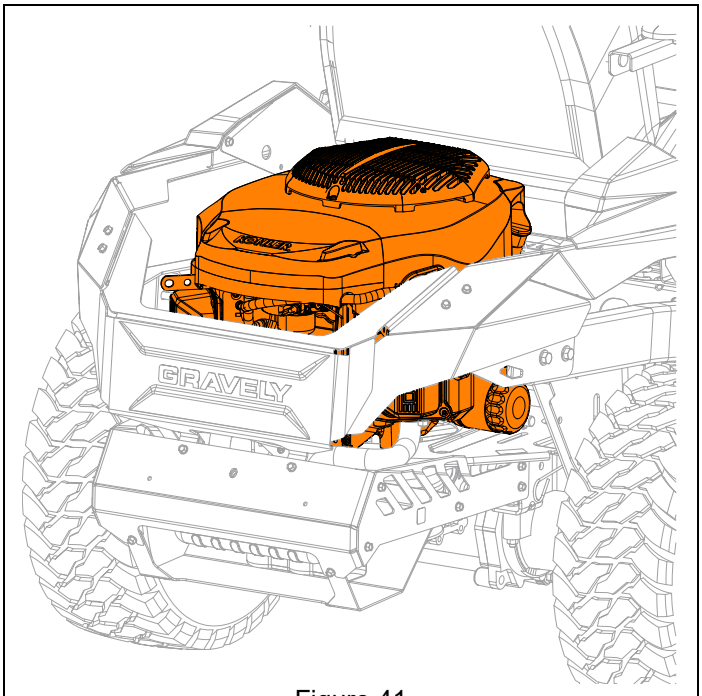


Figure 41

ENGINE TUNING AND MAINTENANCE

Refer to engine manual for all engine maintenance information. For further assistance, please contact engine manufacturer or a reliable engine service dealer.

Check Engine Oil

Refer to Engine Manual.

ENGINE REPLACEMENT

Prepare Unit for Engine Removal

IMPORTANT: Save all parts and hardware for reinstallation.

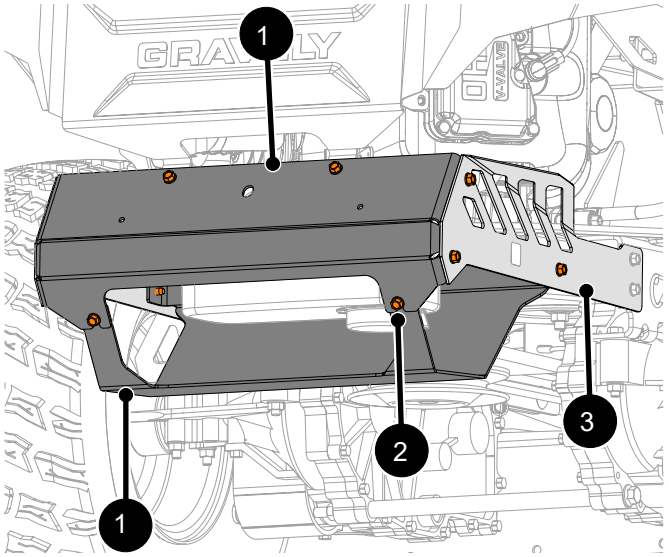
WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

1. Place unit in service position. See *Service Position* on page 10.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

CAUTION: AVOID DAMAGE. DO NOT allow tools to contact metal surfaces when removing positive battery cable.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Carefully clamp fuel line to help prevent fuel leakage.
4. Disconnect fuel line from engine.
5. Remove all engine connections:
   - throttle cable
   - choke cable
   - wiring harness
   - starter connector
   - ground cables
   - vapor-recovery line
6. Remove all tapping screws securing heat shield. Remove heat shield. See Figure 42.



1. Heat Shield
2. Tapping Screws
3. Shield Arm

Figure 42

7. Disconnect idler spring from spring anchor to relieve tension on idler arm. See Figure 43.

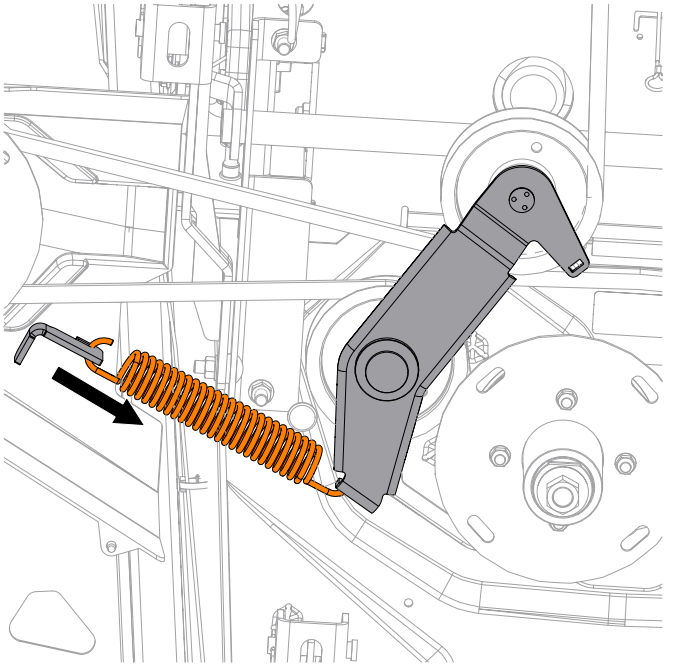
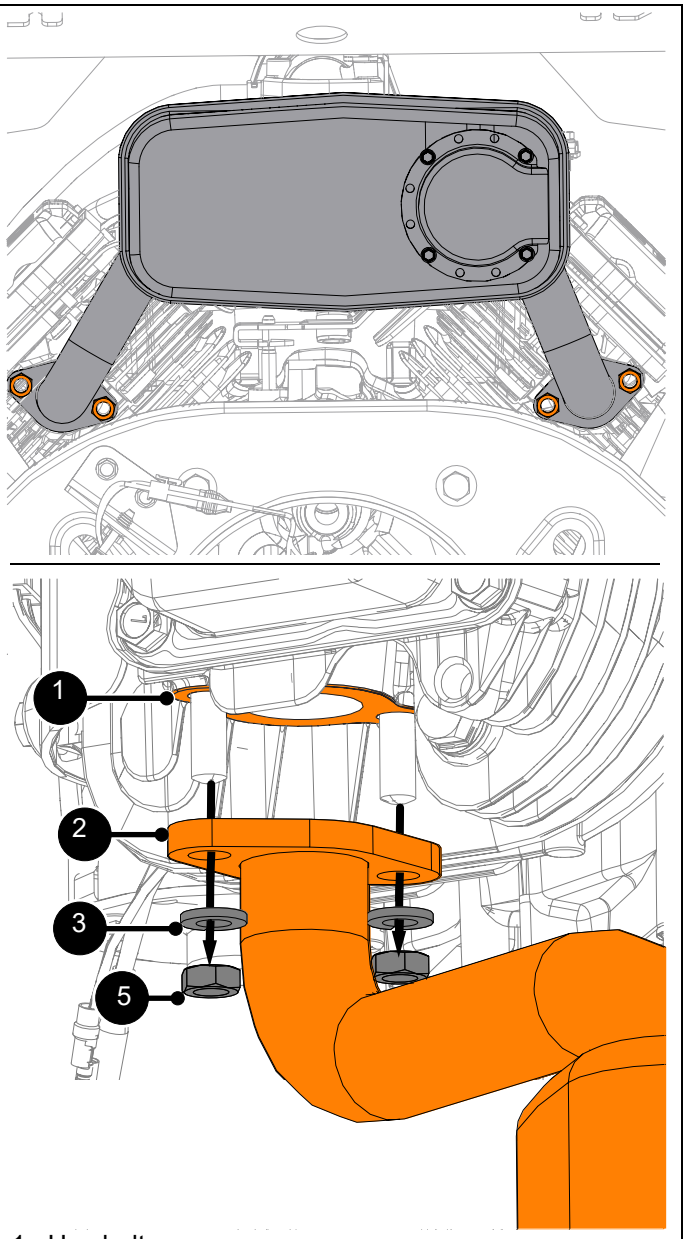


Figure 43

8. Move belt aside.
9. Remove clutch. See *Remove Clutch* on page 29.
10. Remove four lock washers and four nuts securing muffler. Remove muffler and exhaust gasket. See Figure 44.



1. Hex bolt
2. Muffler
3. Exhaust Gasket
4. Lock Washer
5. Nut

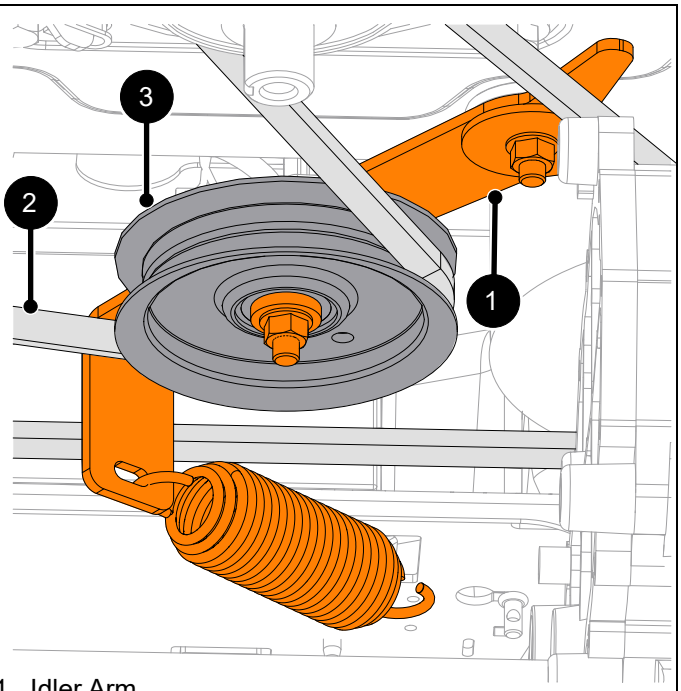
Figure 44

11. Remove deck drive belt. See *Remove Deck Drive Belt* on page 75.

See Figure 45.

12. Remove idler bracket attachment to lower idler arm and move arm to provide clearance. Remove ground drive belt from drive pulley.
13. Remove drive pulley.

IMPORTANT: Watch for key. Key may drop out or may remain in keyway of drive pulley or crankshaft.



1. Idler Arm
2. Ground Drive Belt
3. Drive Pulley

Figure 45

Remove Engine - Kawasaki Models

NOTICE: Always use designated lifting point(s) to avoid engine damage.Lifting points vary, use lifting points for model of engine. Check Engine manual. See Figure 46.

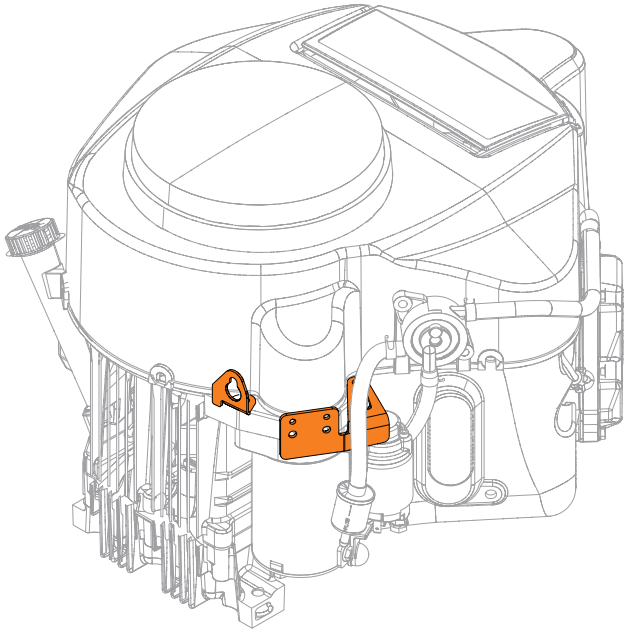


Figure 46

1. Remove hex bolts and washers retaining engine. See Figure 47.

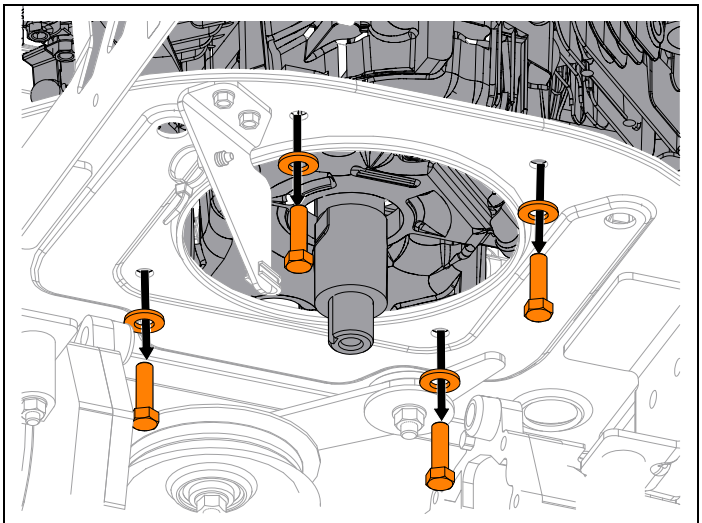


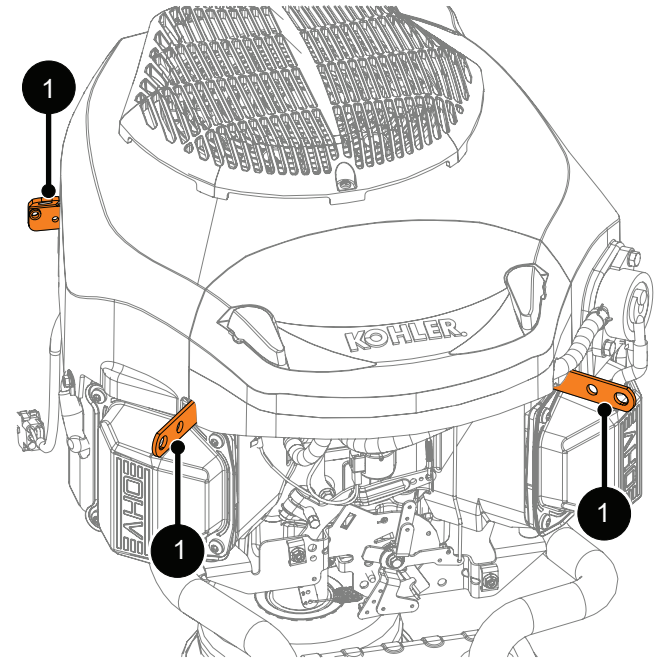
Figure 47

WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

14. Carefully lift and remove engine using equipment suitable for weight of engine.

Remove Engine - Kohler Models

NOTICE: Always use designated lifting points to avoid engine damage. Lifting points vary, use lifting points for model of engine. See Figure 48.



1. Lifting Straps

Figure 48

1. Remove hex bolts retaining engine. See Figure 49.

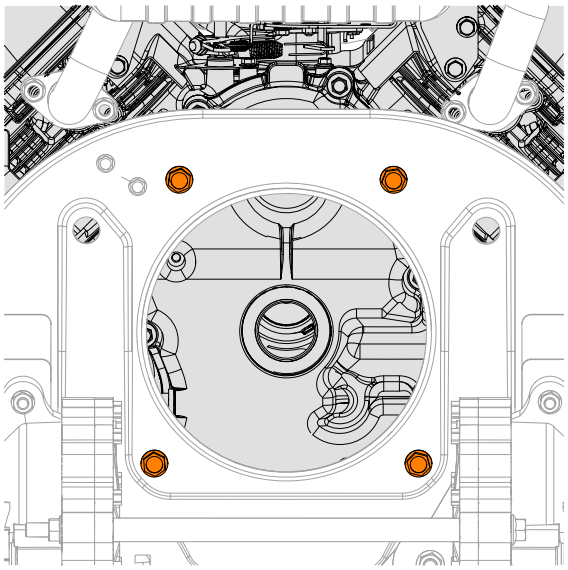


Figure 49

WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

2. Carefully lift and remove engine using equipment suitable for weight of engine.

Install Engine - Kawasaki Models

WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

1. Carefully lift and replace engine using equipment suitable for weight of engine.

NOTICE: Always use designated lifting points to avoid engine damage. Lift points vary, use lift points per model. See Figure 46.

See Figure 50.

2. Secure engine to frame using hex bolts and washers removed previously.
3. Manually tighten engine hex bolts three to four turns, then torque to 33 N•m – 35 N•m (24 lb-ft – 26 lb-ft). DO NOT overtighten.

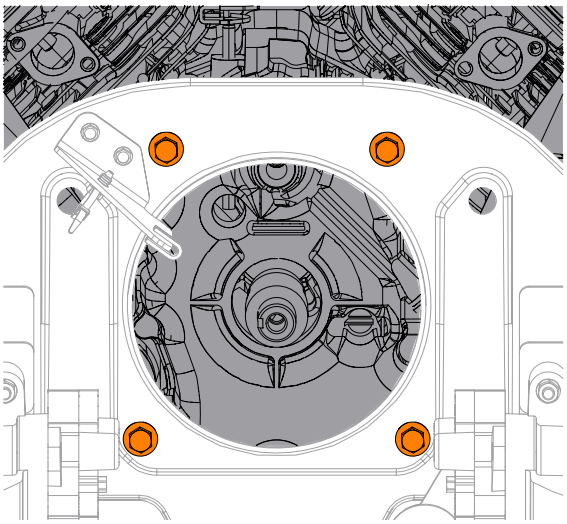


Figure 50

Install Engine - Kohler Models

WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

1. Carefully lift and replace engine using equipment suitable for weight of engine.

NOTICE: Always use designated lifting points to avoid engine damage. Lift points vary, use lift points per model. Check Engine manual. See Figure 48.

See Figure 51.

2. Secure engine to frame using hex bolts.
3. Manually tighten screws three to four turns, then torque to 43 N•m – 52 N•m (384 lb-in – 456 lb-in). DO NOT overtighten.

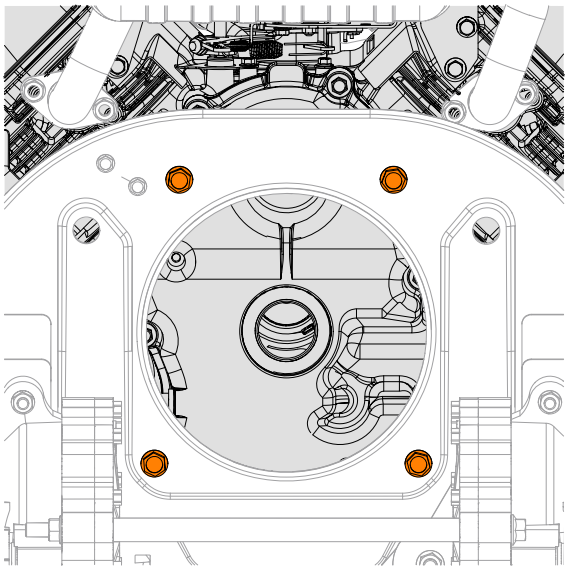
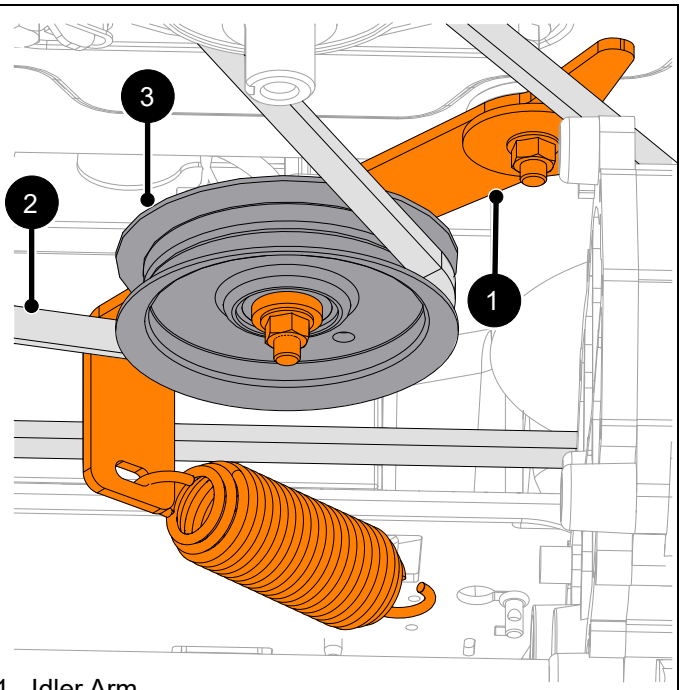


Figure 51

Complete Unit after Engine Installation

See Figure 52.

1. Install drive pulley.
2. Reinstall idler arm and idler bracket, and reroute ground drive belt around drive pulley.



1. Idler Arm
2. Ground Drive Belt
3. Drive Pulley

Figure 52

3. Connect idler spring to idler arm. See Figure 53.

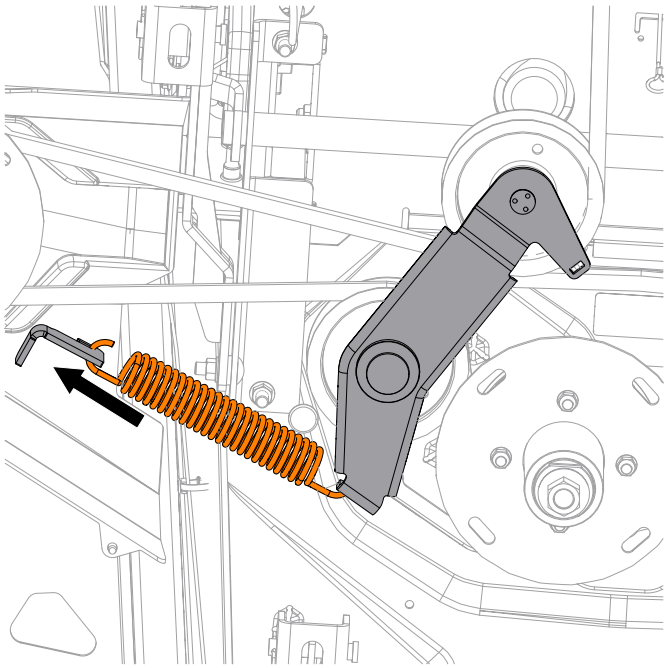
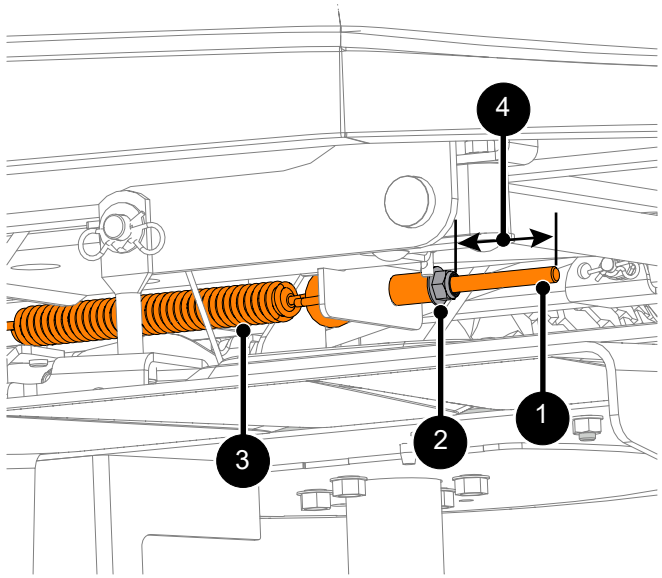


Figure 53

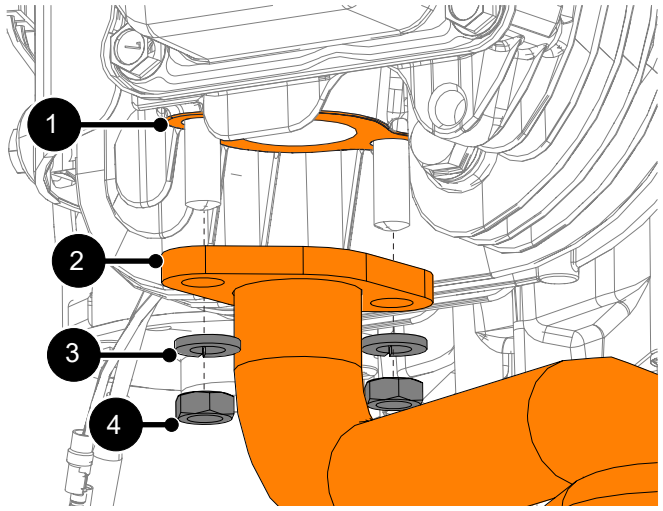
4. Install clutch. DO NOT reconnect wire harness pigtail. See *Install Clutch* on page 30.
5. Reinstall deck drive belt. See *Install Deck Drive Belt* on page 75.
6. Reconnect wire harness pigtail to clutch.
7. Adjust tension of idler spring by returning nut on eye bolt to previously measured value or 61 mm (2 13/32"). See Figure 54.



1. Eye Bolt
2. Nut
3. Idler Spring
4. Measured value or 61 mm (2 13/32")

Figure 54

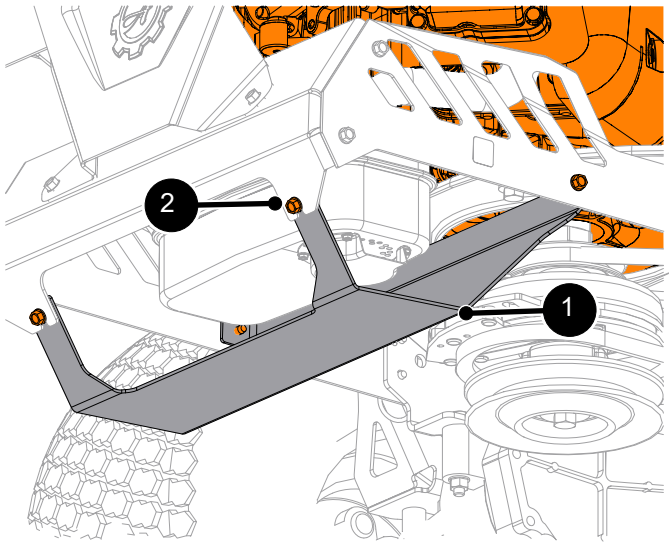
8. Reinstall muffler assembly if removed. See Figure 55.



1. Exhaust Gasket
2. Muffler
3. Lock Washer
4. Nut

Figure 55

2. Reinstall heat shield, if removed, and retain with four tapping screws. See Figure 55.



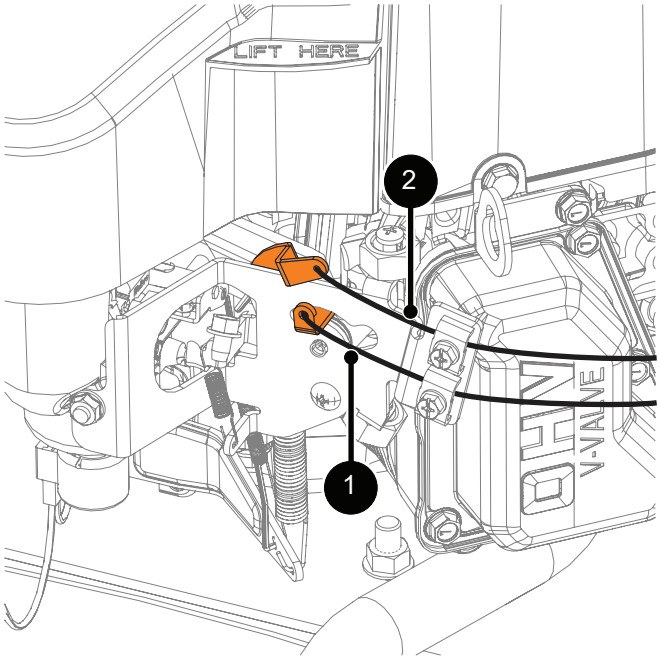
1. Heat Shield
2. Tapping Screw

Figure 55

See Figure 56. Kawasaki shown. Kohler similar.

3. Reinstall all engine connections disconnected during removal of engine:
   - throttle cable
   - choke cable
   - wiring harness
   - starter connector
   - ground cables
   - vapor-recovery line
4. Carefully connect and check all electric connections.
5. Reconnect fuel line, making sure there are no leaks.

NOTICE: If any zip ties or clips were removed or cut off during removal of these items, install new zip ties/clips to ensure items are secured properly.



1. Choke Cable
2. Throttle Cable

Figure 56

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

6. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
7. Inspect engine and mower to ensure correct installation of parts, belts, etc.
8. Reconnect spark plug wire(s).

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

NOTICE: After reconnecting choke and throttle cables, ensure that minimum and maximum engine speeds are within specification. See Specifications in Engine Owner's Manual for recommended engine speeds.

CLUTCH REPLACEMENT

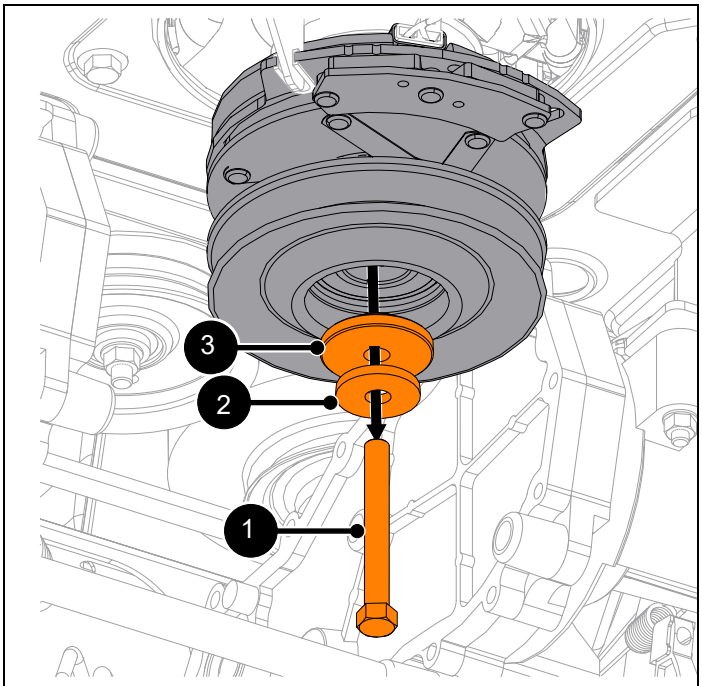
Remove Clutch

CAUTION: AVOID INJURY. Support clutch while disconnecting pigtail. Clutch may drop once pigtail is removed.

1. Disconnect clutch pigtail.

WARNING: AVOID INJURY. Support clutch while removing hardware.

2. While supporting clutch, remove one hex bolt, one flange bushing and one washer to remove clutch. See Figure 57.



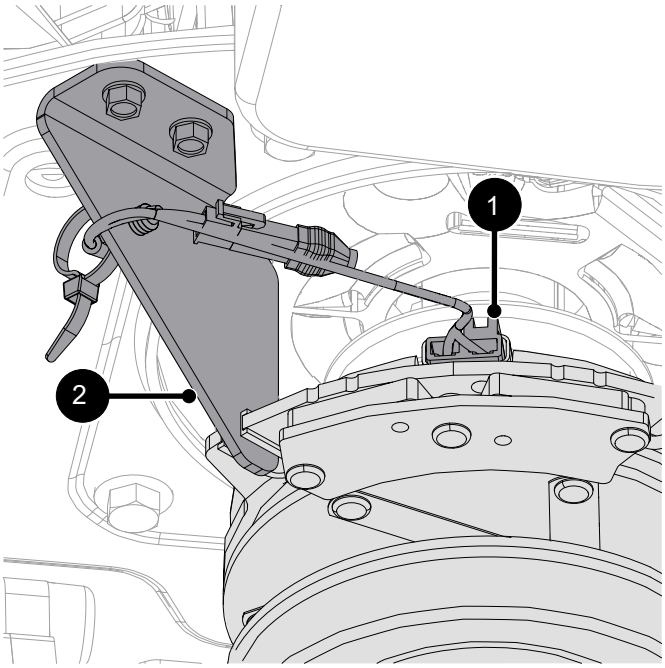
1. Hex Bolt
2. Washer
3. Flange Bushing

Figure 57

Install Clutch

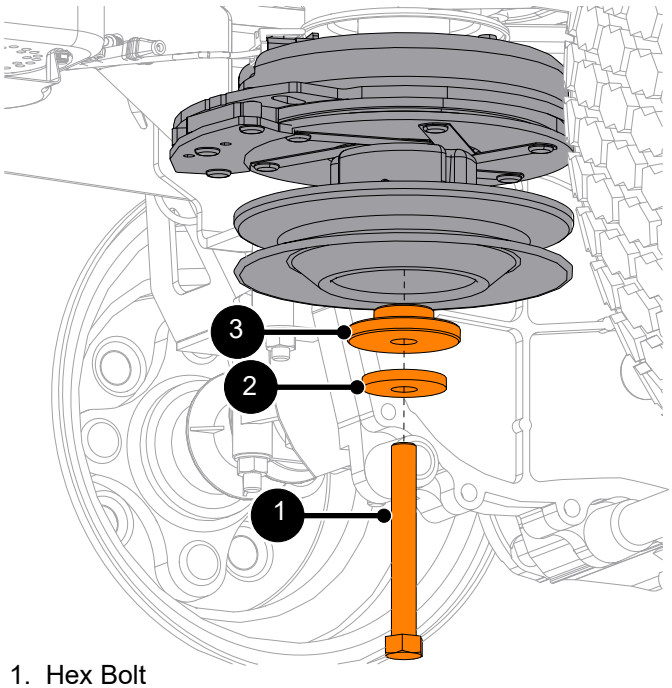
See Figures 58 and 59.

1. Ensure that clutch stop pin is engaged in clutch stop and reinstall clutch. Retain with one hex bolt, one flange bushing and one washer removed previously. Ensure that cupped side of washer faces engine.
2. Torque clutch hex bolt to 45 N•m – 66 N•m (33 lb-ft – 49 lb-ft). DO NOT overtighten.
3. Reconnect wire harness pigtail to clutch.



1. Clutch Pigtail
2. Clutch Stop Bracket

Figure 58



1. Hex Bolt
2. Washer
3. Flange Bushing

Figure 59

CLUTCH STOP BRACKET REPLACEMENT

Remove Clutch Stop Bracket

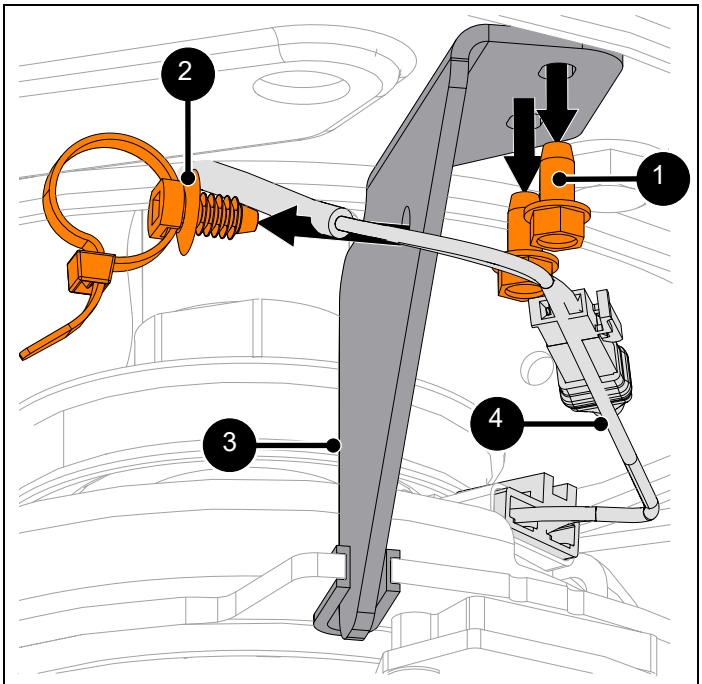
IMPORTANT: Save all parts and hardware for reinstallation. Gravely recommends new tapping screws.

1. Place unit in service position. See *Service Position* on page 10.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

CAUTION: AVOID DAMAGE. DO NOT allow tools to contact metal surfaces when removing positive battery cable.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Remove two tapping screws and one mounting push screw from clutch stop bracket. See Figure 60.



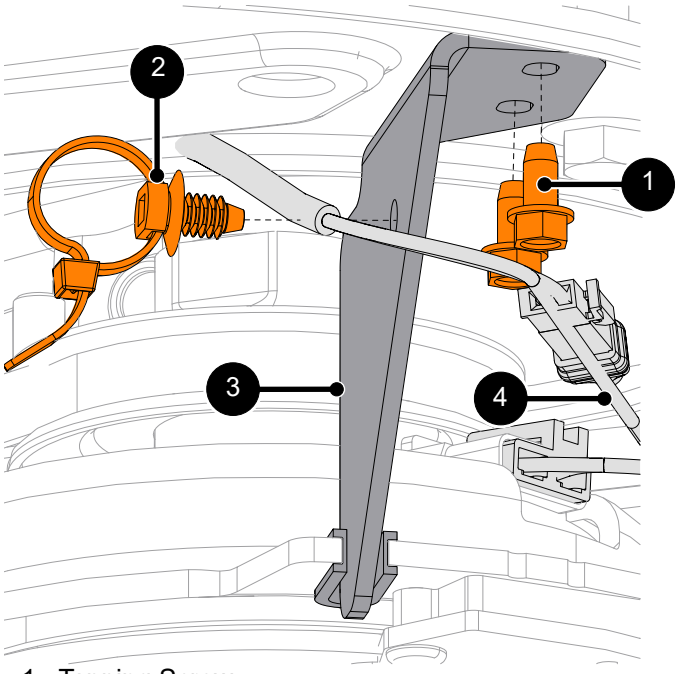
1. Tapping Screw
2. Mounting Push Screw with Cable Tie
3. Clutch Stop Bracket
4. Wire Harness

Figure 60

4. Cut and dispose of cable tie securing wire harness to mounting push screw.
5. Remove bracket from slot in clutch.

Install Clutch Stop Bracket

1. Slide clutch stop bracket into slot in clutch.
2. Reinstall two tapping screws and one mounting push screw into clutch stop. See Figure 61.



1. Tapping Screw
2. Mounting Push Screw with Cable Tie
3. Clutch Stop Bracket
4. Cable Wiring

Figure 61

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

3. Secure wiring harness to mounting push screw using a new cable tie.
4. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
5. Inspect engine and mower to ensure correct installation of parts, belts, etc.
6. Reconnect spark plug wire(s).

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

FUEL SYSTEM

FUEL LINE ENGINE CONNECTIONS

Each engine connects to fuel system in different locations. See Figures 62 and 63 for fuel connection locations.

Kawasaki Engine

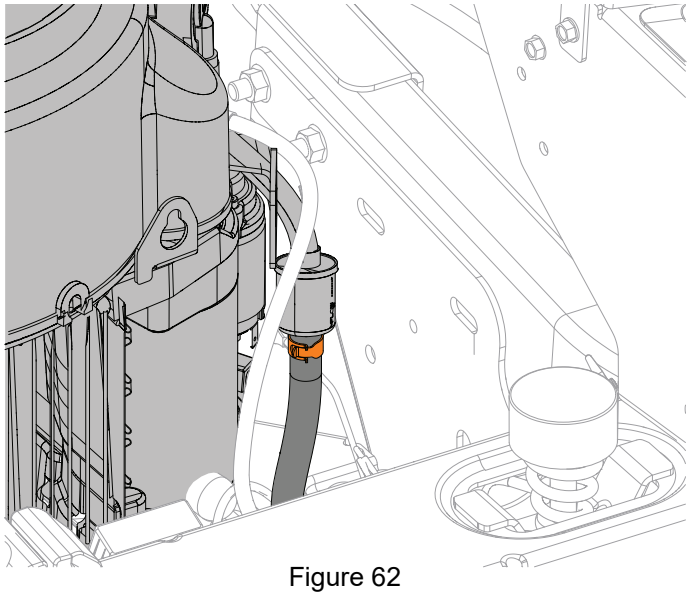


Figure 62

Kohler Engine

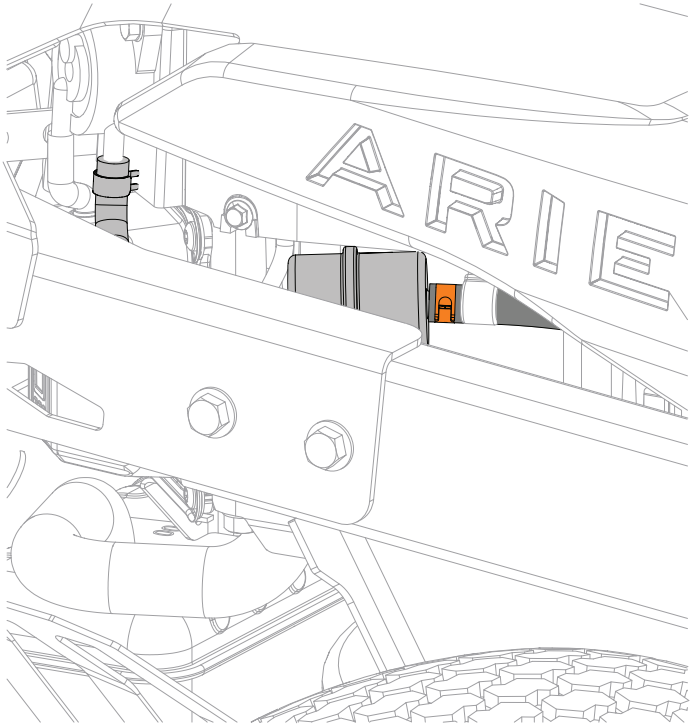


Figure 63

FUEL FILTER REPLACEMENT

Remove Fuel Filter

IMPORTANT: Save all parts and hardware for reinstallation. Gravely recommends new tapping screws.

NOTICE: A clogged fuel filter can affect engine performance.

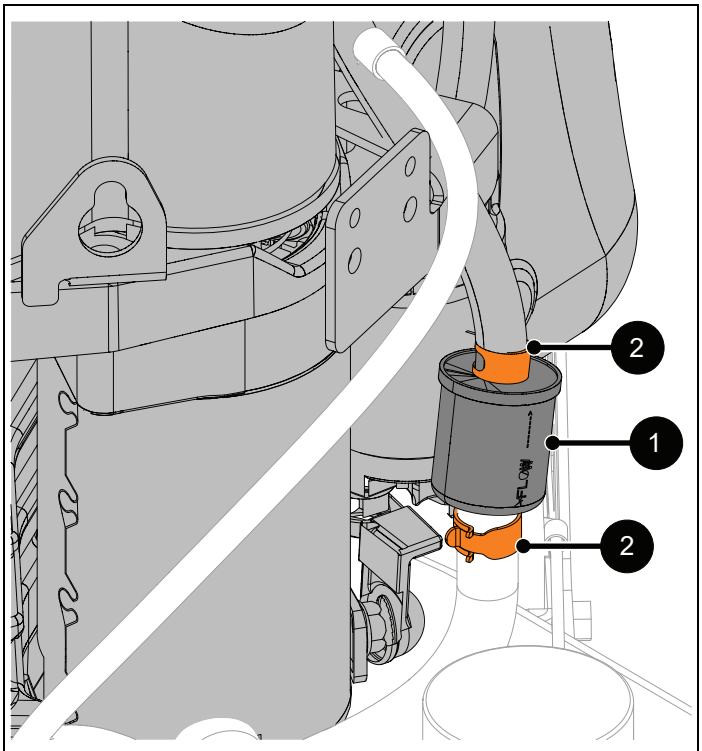
1. Place unit in service position. See *Service Position* on page 10.

> **CAUTION:** AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Position drain pan under fuel tank and fuel line.

See Figure 64.

4. Carefully clamp fuel line using hose pinching pliers to help prevent fuel leakage.
5. Remove clamps that secure fuel line to filter.
6. Disconnect fuel line from fuel filter.



1. Fuel Filter
2. Fuel Line Clamp

Figure 64

7. Remove fuel filter.

Install Fuel Filter

See Figure 65.

1. Carefully connect and tighten fuel line to new fuel filter with clamps removed previously, ensuring there are no leaks.

IMPORTANT: Ensure fuel filter arrow on filter is pointing in direction of fuel flow.

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

2. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
3. Return unit to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

FUEL LINE REPLACEMENT

Remove Fuel Line

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.

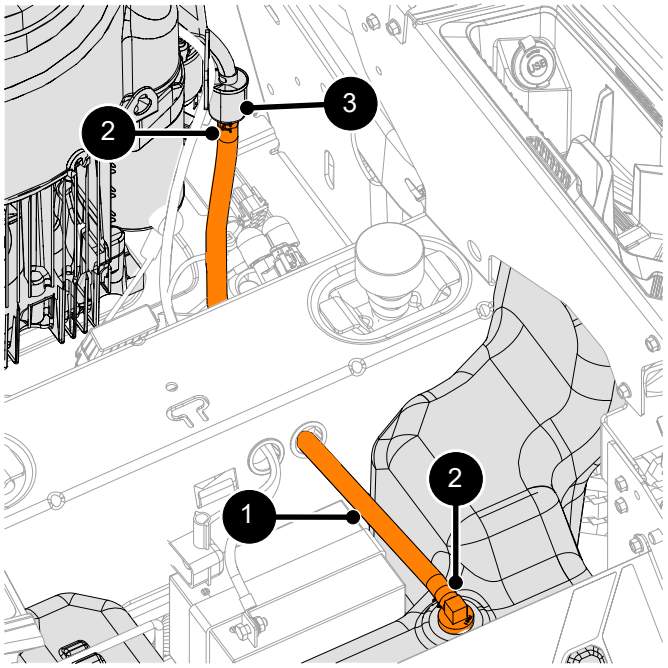
CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

CAUTION: AVOID DAMAGE. DO NOT allow tools to contact metal surfaces when removing positive battery cable.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Position drain pan under fuel tank and fuel line.

See Figure 65.

4. Carefully clamp fuel line using hose pinching pliers to prevent fuel leakage.
5. Remove clamps that secure fuel line to tank, fuel filter and engine and disconnect fuel line.
6. Remove fuel line.



1. Fuel Line
2. Hose Clamps
3. Fuel Filter

Figure 65

Install Fuel Line

1. Reconnect fuel line using new fuel filter, and secure to engine and tank with clamps removed earlier. Ensure there are no leaks.

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

2. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
3. Return unit to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

FUEL TANK REPLACEMENT

Perform Preliminary Procedures

IMPORTANT: Save all parts and hardware for reinstallation.

IMPORTANT: Fuel tank is located under seat between left fender and seat.

> **WARNING:** AVOID INJURY. Before servicing, drain all fuel from tank and fuel system. Ensure that unit is drained of all fuel.

1. Remove fuel.
2. Disconnect fuel cap with tether from tank.See Figure 66.

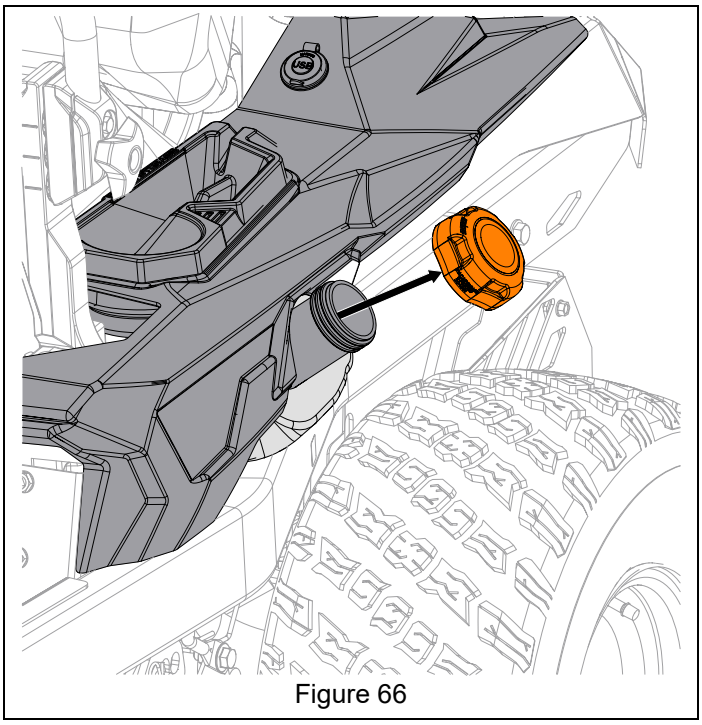


Figure 66

3. Remove left fender. See *Fender Replacement* on page 14.
4. Remove three tapping screws securing left fender mount. Remove mount. See Figure 67.

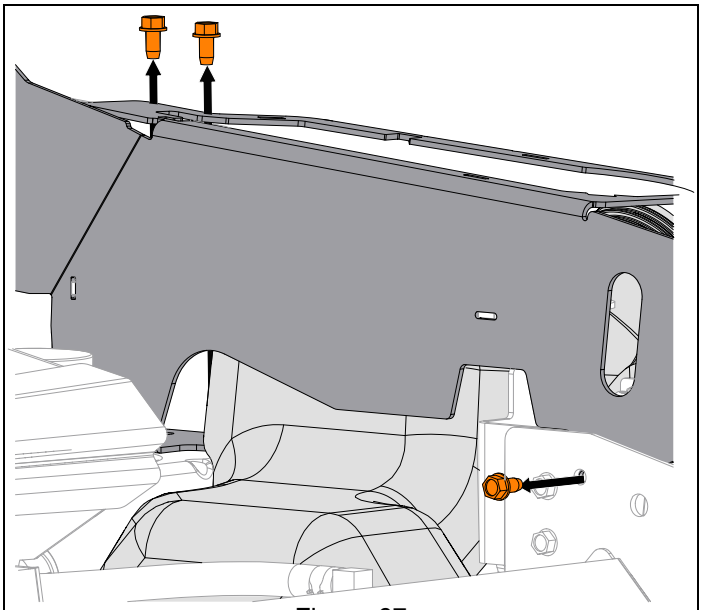


Figure 67

Remove Fuel Tank

IMPORTANT: Save all parts and hardware for reinstallation.

See Figures 68 and 69.

1. Ensure that *Perform Preliminary Procedures* were completed.

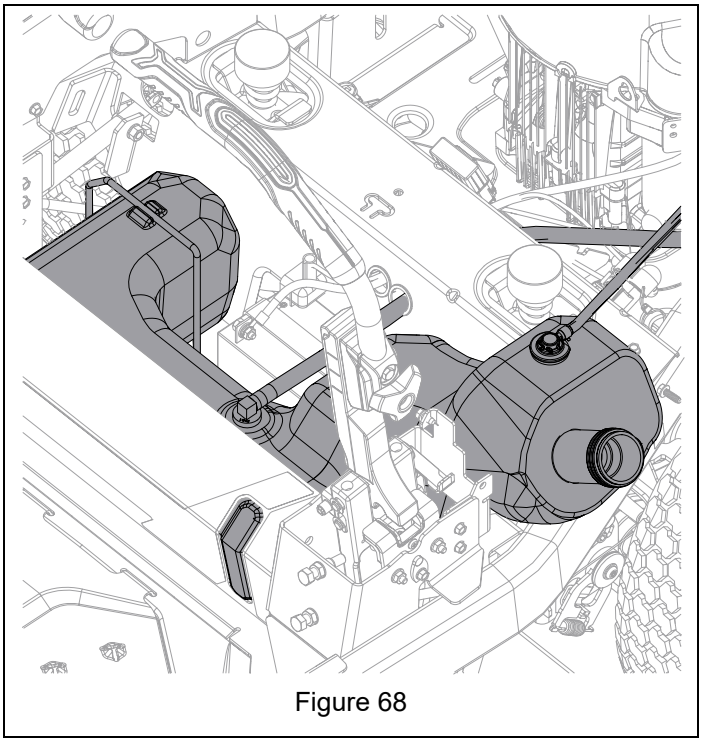
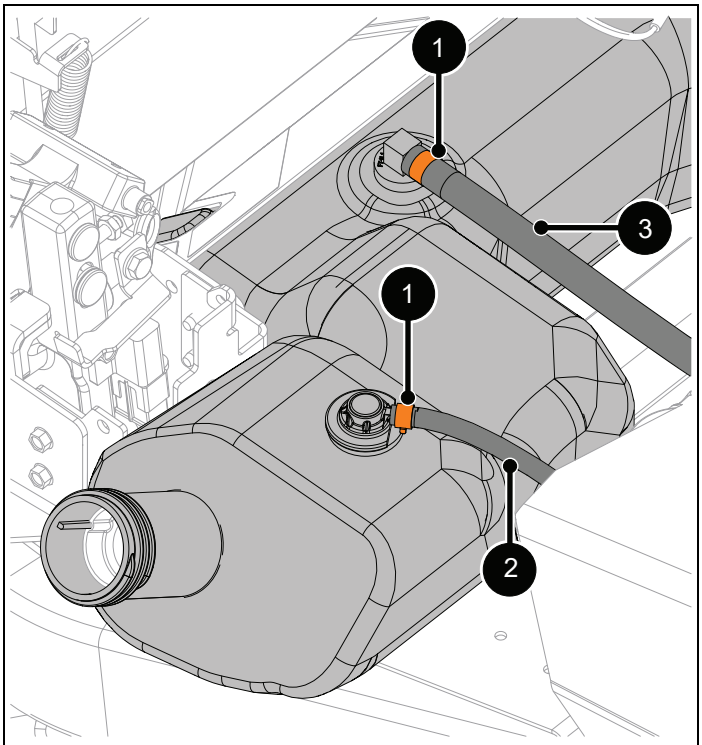


Figure 68

2. Clamp fuel lines using hose pinching pliers to prevent any fuel leaks.
3. Remove clamps and disconnect fuel line and vapor-recovery line.



1. Clamp
2. Vapor Recovery Line
3. Fuel Line

Figure 69

4. Remove nut under fuel tank and remove bracket retaining fuel tank. See Figures 70 and 71.

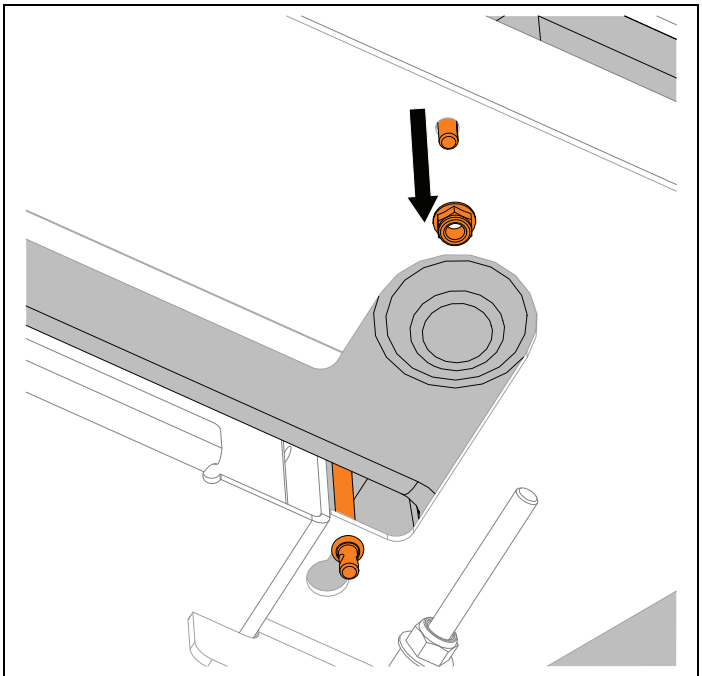


Figure 70

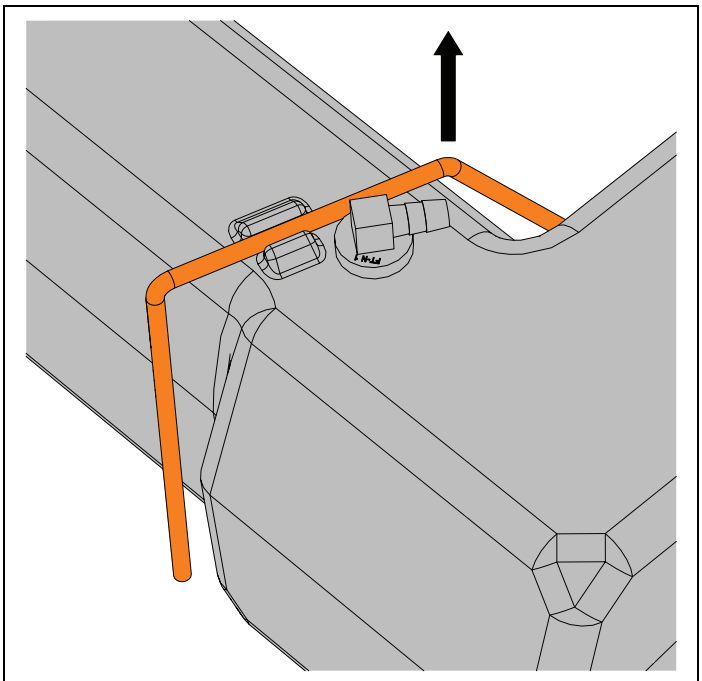


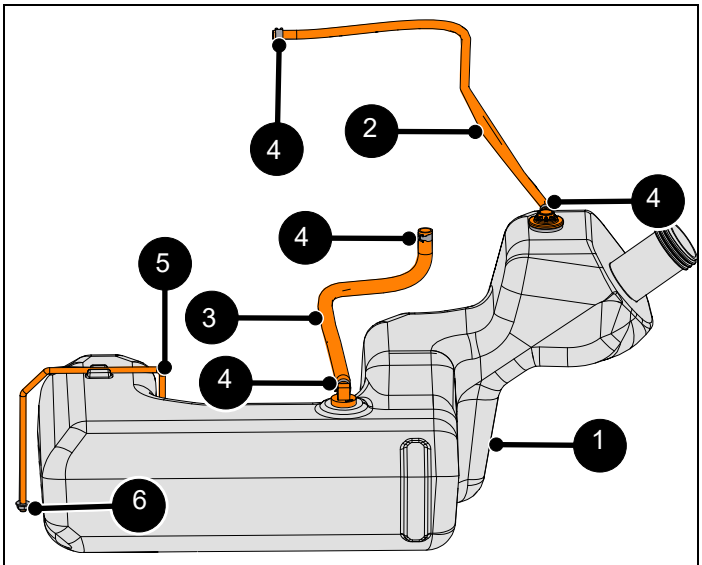
Figure 71

5. Carefully remove fuel tank.

Install Fuel Tank

See Figure 72.

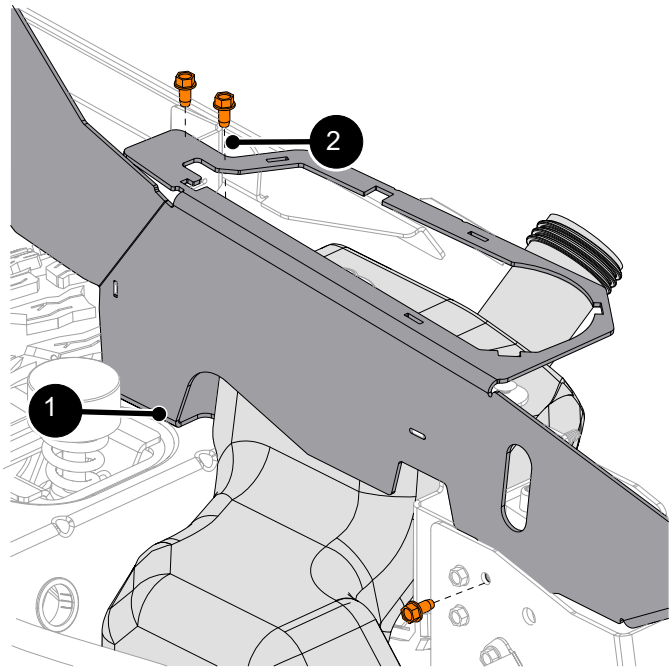
1. Position fuel tank. Ensure rubber tank pad is in correct position under tank.
2. Reinstall fuel tank bracket and secure with nut under fuel tank removed earlier.
3. Reconnect vapor-recovery line and fuel line and secure to tank with clamps removed previously. Ensure there are no leaks.



1. Fuel Tank
2. Vapor-recovery Line
3. Fuel Line
4. Clamp
5. Fuel Tank Bracket
6. Nut

Figure 72

4. Reinstall left rear fender mount and secure with original hardware. See Figure 73.



1. Rear Fender Mount
2. Tapping Screw

Figure 73

5. Reinstall left fender. See *Fender Replacement* on page 14.
6. Return unit to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

STEERING

This unit has two independent transaxles. Each transaxle is controlled by a lever which provides rear wheel differential steering. Differences in speed between wheels allows operator to change direction and to rotate unit by 360 degrees.

See Figure 74.

These two independent levers must be properly adjusted using two different criteria:

- Ergonomic adjustment = adjusting operator and mechanical alignment between levers
- Adjusting unit to track straight = obtaining straight forward movement of unit by aligning levers with each other

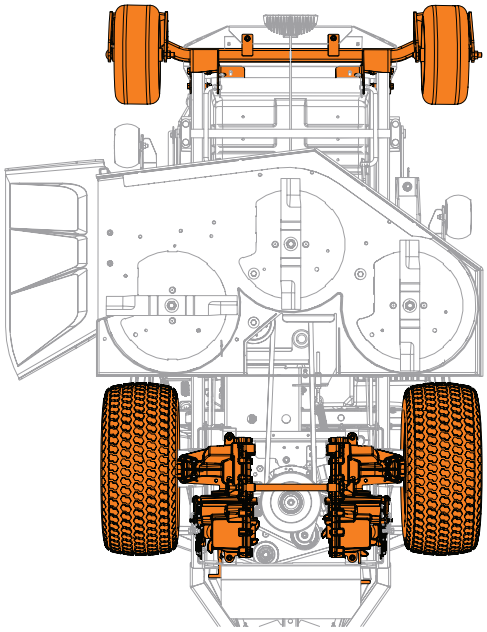
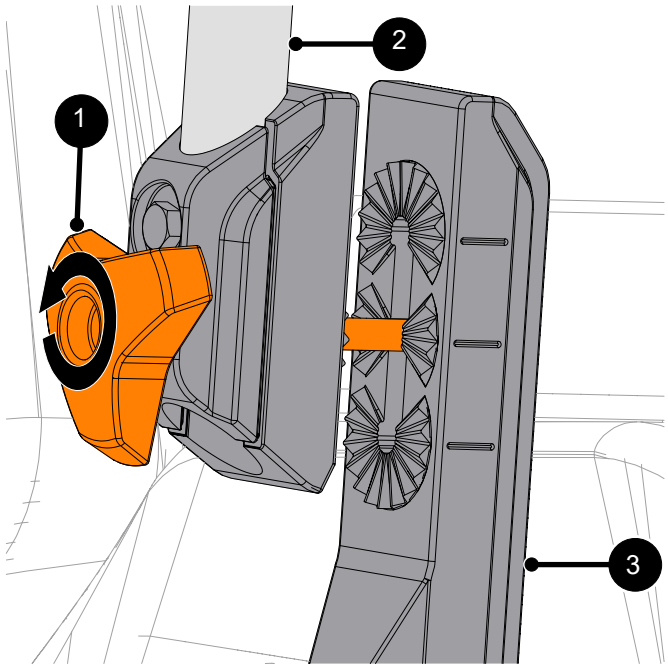


Figure 74

STEERING ADJUSTMENTS

Adjust Steering Lever Height

1. Turn steering adjustment knob to loosen connection of steering arm and handle bar. See Figure 75.



1. Adjustment Knob
2. Handle Bar
3. Steering Arm

Figure 75

4. Slide handle bar into preferred height. See Figure 76.
   - Use upper connection for highest lever position.
   - Use lower connection for lowest lever position.

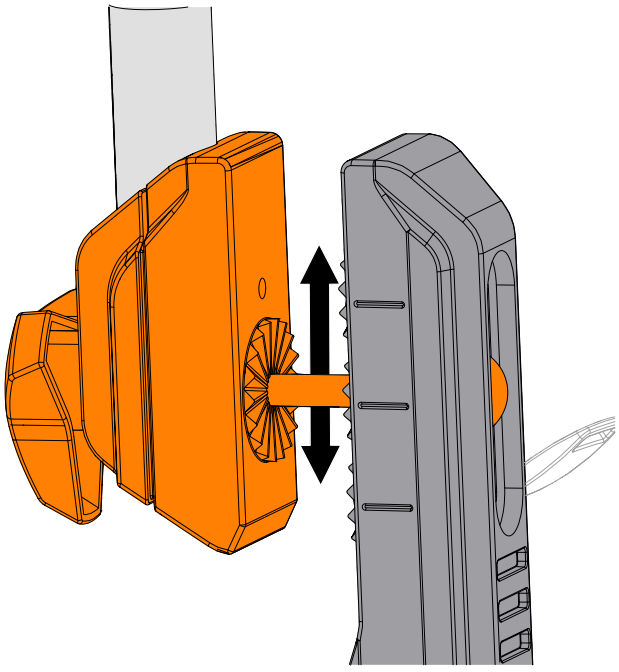


Figure 76

WARNING: AVOID INJURY. Always secure lever with two nuts.

5. Align levers side to side. See *Adjust Steering Lever Reach* on page 38.
6. Tighten adjustment knob ensuring teeth are fully seated.

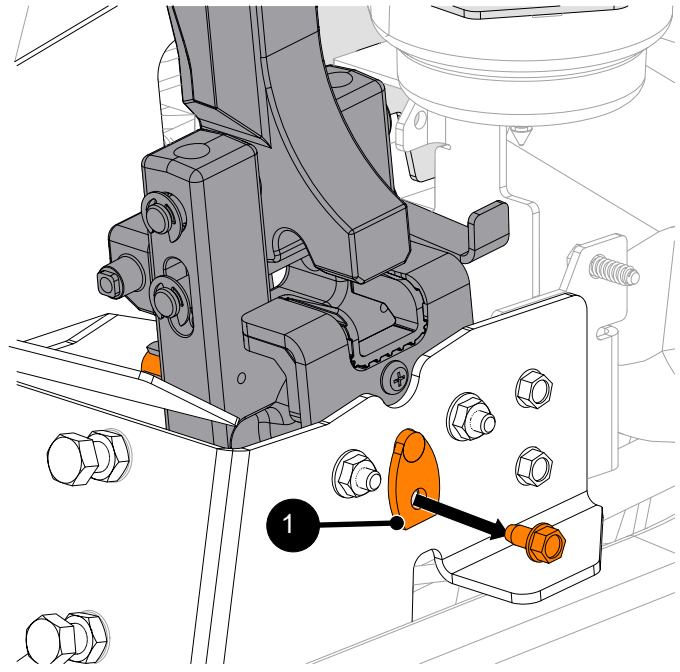
IMPORTANT: Check all adjustments after first use.

Adjust Steering Lever Reach

See Figure 77 and 78.

IMPORTANT: Save all parts and hardware for reinstallation.

1. Loosen hardware securing steering lever.
2. Pivot steering arm on steering pin to preferred distance from seat and between levers.



1. Steering Pin

Figure 77

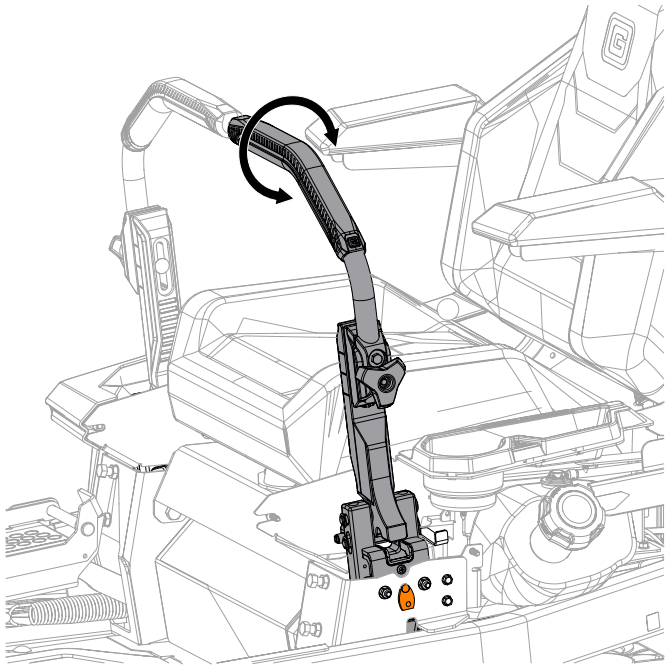
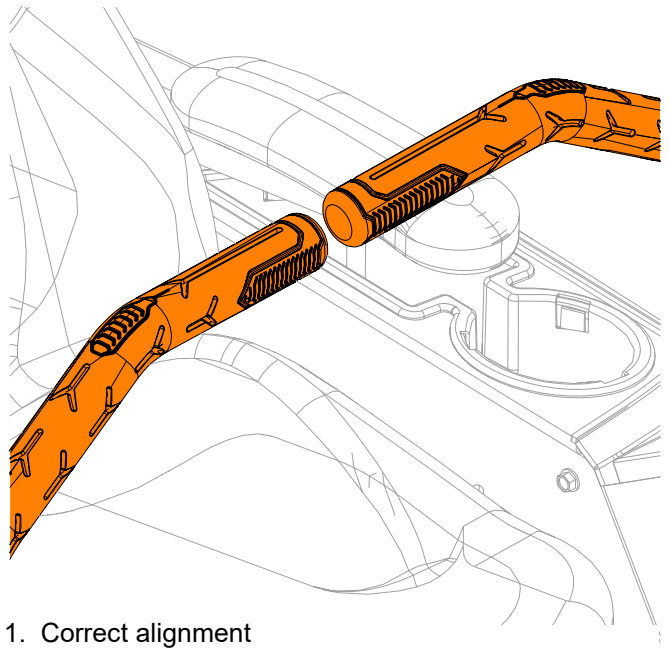


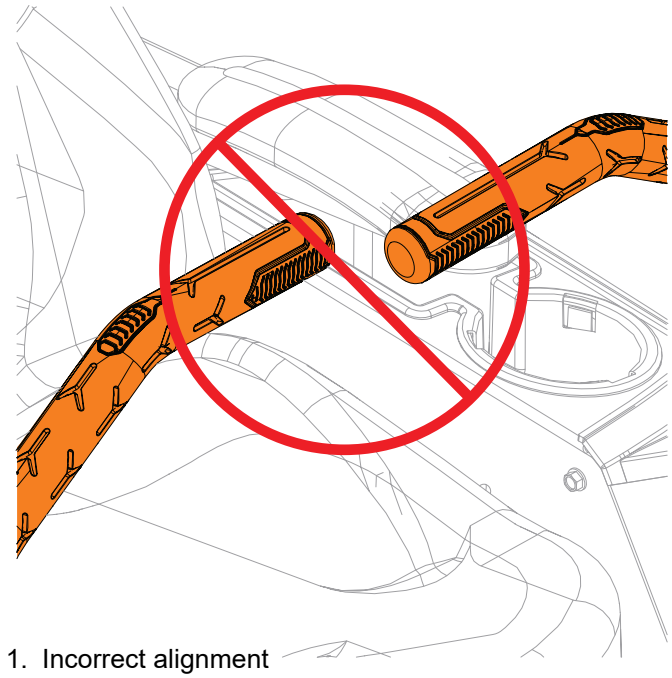
Figure 78

3. Ensure handlebars are correctly aligned. See Figures 79 and 80.



1. Correct alignment

Figure 79



1. Incorrect alignment

Figure 80

4. Retighten all hardware.

NOTICE: Tighten upper hardware first.

Adjust Tracking

Unit should not veer left or right more than 60 cm (2 feet) after traveling forward 9 meters (30 feet).

Reverse tracking is not adjustable.

IMPORTANT: Save all parts and hardware for reinstallation.

1. Check pressure of both tires. See *Check Tire Pressure* on page 43.

IMPORTANT: See Specifications in Operator's Manual for recommended tire pressures.

IMPORTANT: DO NOT exceed maximum tire pressure listed on tire sidewall.

2. Recheck unit tracking. If unit still does not track straight, adjust steering levers.

IMPORTANT: Check all adjustments after first use.

Adjust Steering Levers

See Figures 81 and 82.

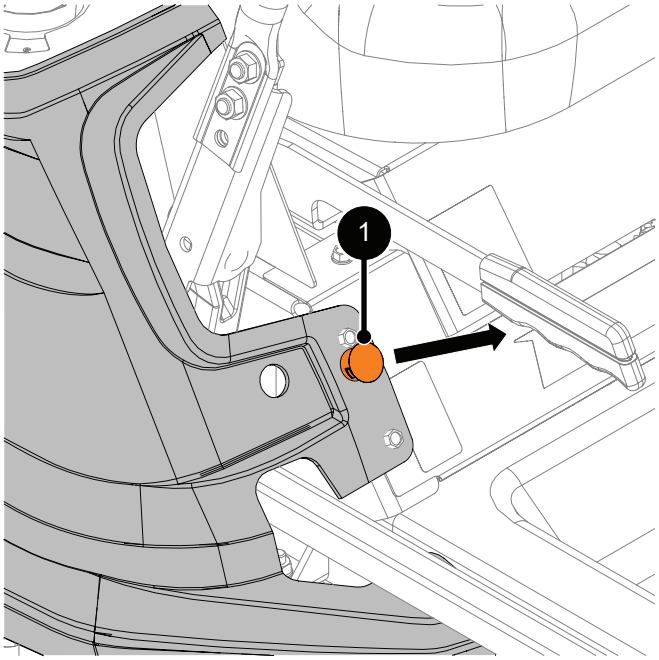
If adjusting tire pressure did not correct tracking problem:

1. Remove plug from fender to access adjustment bolt.
2. Loosen jam nut on adjustment bolt of steering lever that needs adjustment.
3. Adjust drive wheel speed.
   - Rotate adjustment bolt counterclockwise to increase steering lever travel and drive wheel speed.
   - Rotate adjustment bolt clockwise to decrease steering lever travel and drive wheel speed.
4. Retighten jam nut.

NOTICE: Adjustment bolt must contact steering lever. DO NOT turn adjustment bolt too far counterclockwise.

5. Replace plug in fender.
6. Adjust steering levers. See *Steering Adjustments* on page 37.

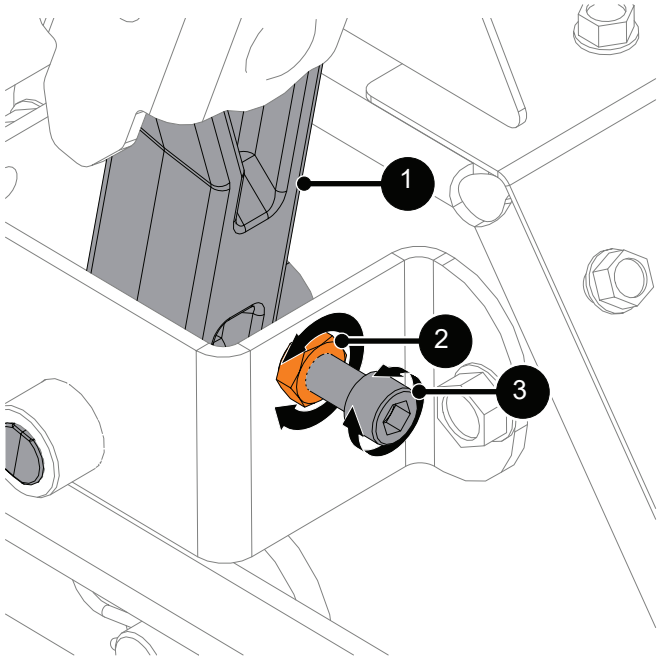
IMPORTANT: Check all adjustments after first use.



1. Plug

Figure 81

Fender removed for clarity



1. Control Arm
2. Jam Nut
3. Adjustment Bolt

Figure 82

REPLACE LOWER CONTROL ARM

Remove Lower Control Arm

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove left or right fender. See *Remove Left Fender* on page 14 or *Remove Right Fender* on page 15.
3. Remove two flange nuts retaining arm to steering bracket. See Figure 83.

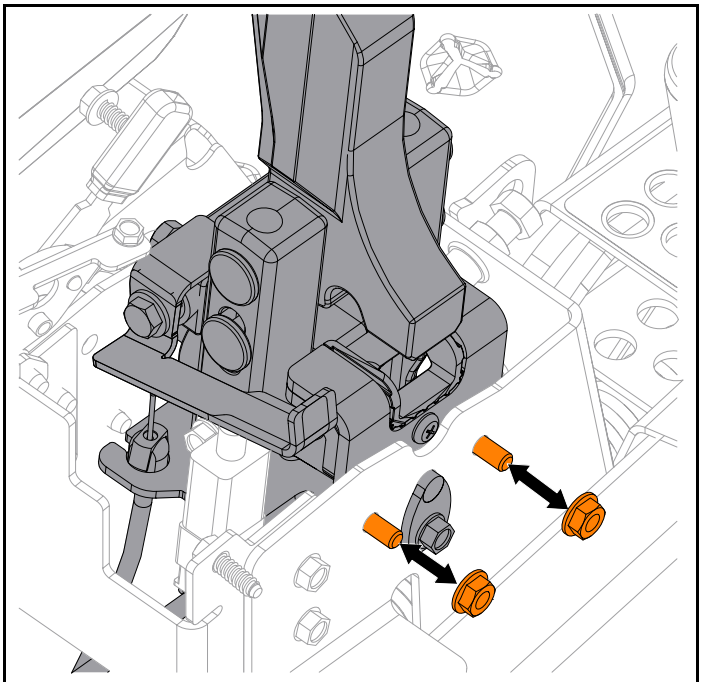


Figure 83

4. Remove one tapping screw retaining switch brake. Remove switch brake. See Figure 81.

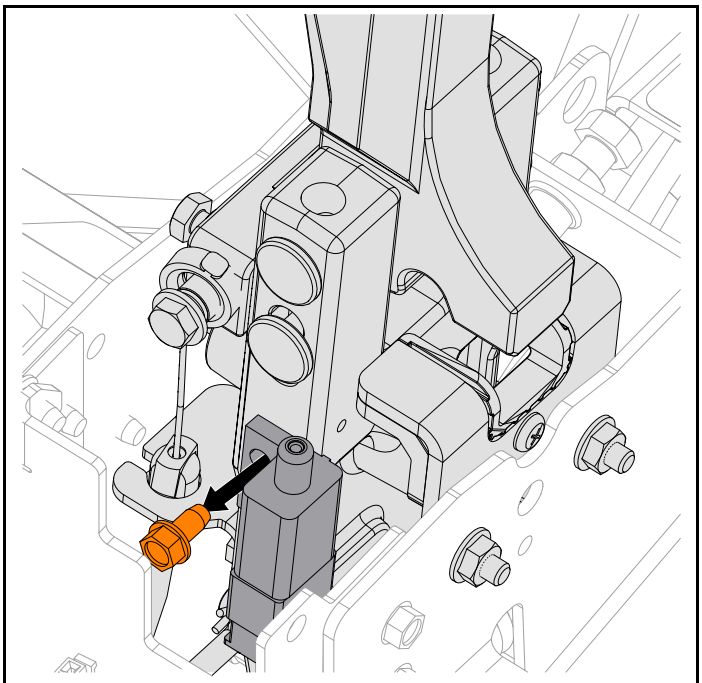
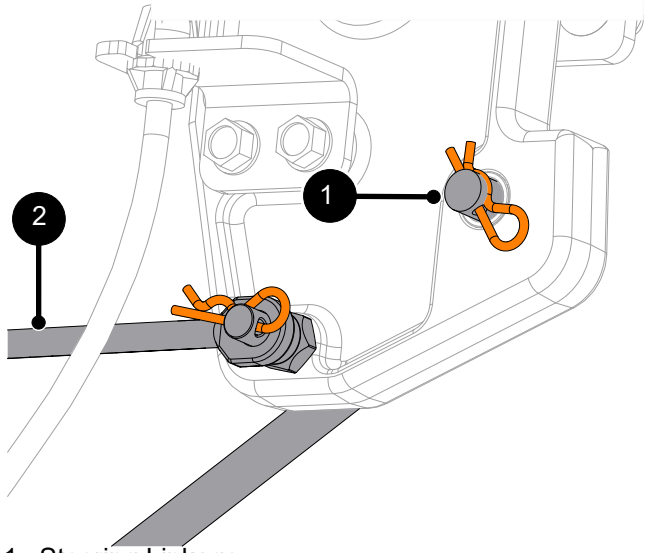


Figure 84

5. Remove pins to release steering linkage and damper from arm. Remove steering linkage and damper. See Figure 85.



1. Steering Linkage
2. Damper

Figure 85

6. Remove one hex bolt and unsnap brake cable from bracket. Remove brake cable. See Figure 86.

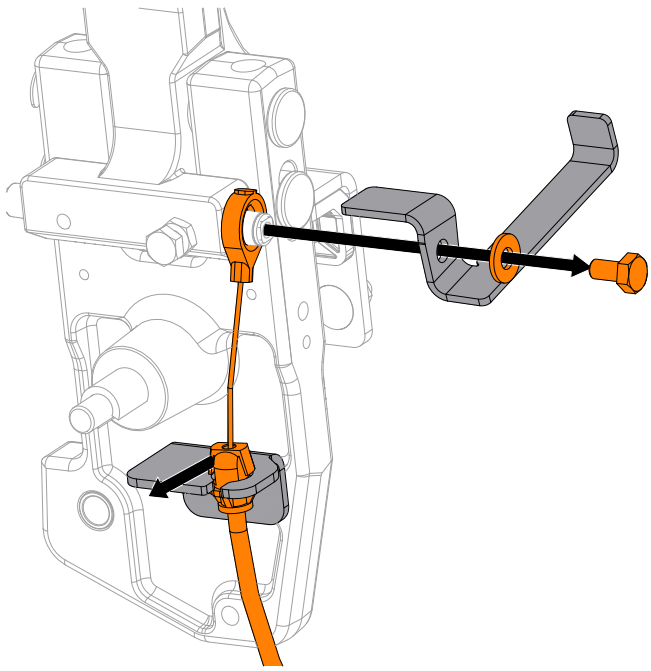


Figure 86

7. Remove one hex bolt, two pivot pins and two retaining rings. Discard retaining rings. See Figure 69.

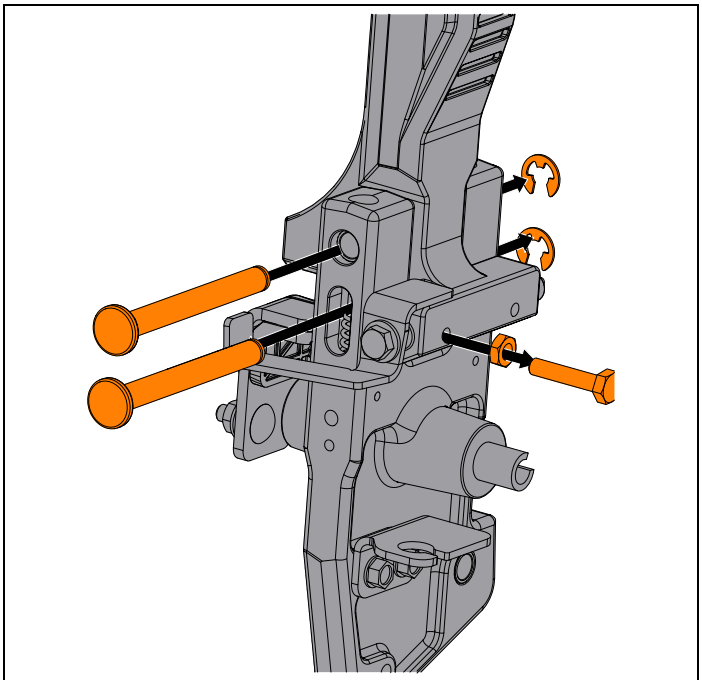


Figure 87

See Figure 70.

8. Remove one raised head bolt and one hex bolt to disassemble the upper handle bar.
9. Remove the lower control arm.

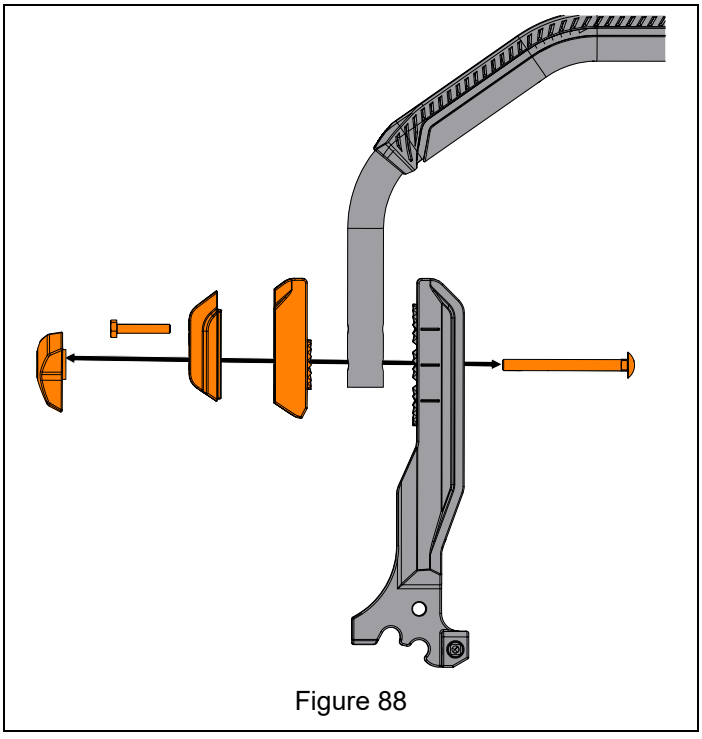


Figure 88

10. Return unit to operating position.

Install Lower Control Arm

1. Seat lower control arm into steering arm.

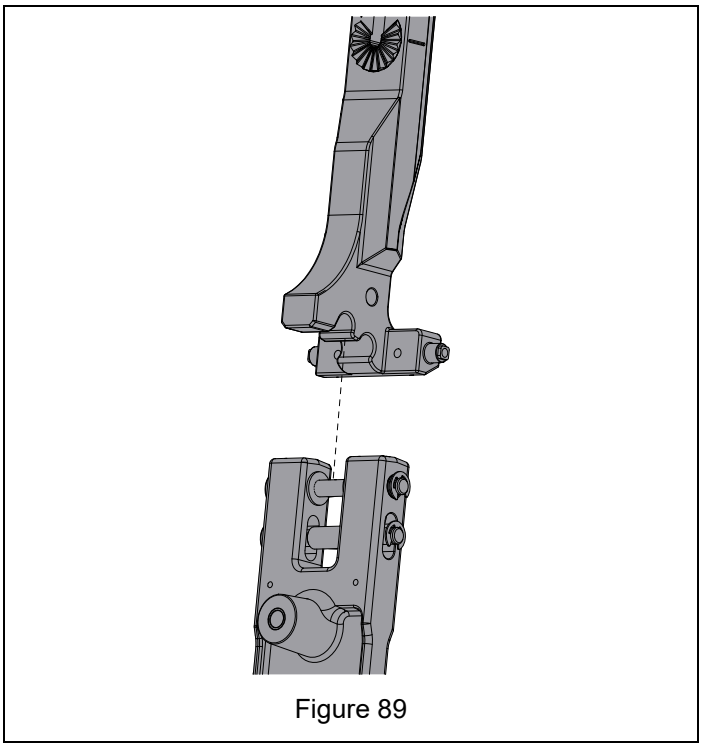


Figure 89

2. Reassemble the upper handle bar using previously removed hardware.

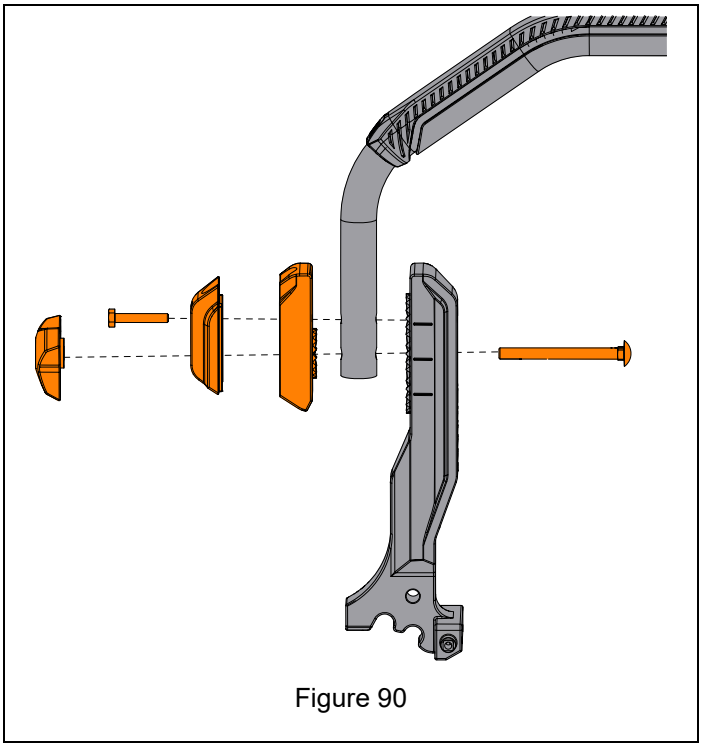


Figure 90

3. Reinstall one hex bolt, two pivot pins and two replacement retaining rings. See Figure 87.
4. Reattach the steering cable to the upper arm using previously removed hardware. See Figure 86.
5. Reattach the steering linkage and damper using pins removed previously. See Figure 85.
6. Reattach switch brake with previously removed hardware. See Figure 84.
7. Reinstall upper steering arm to pivot bracket on lower steering arm using two tapping screws. See Figure 83.
8. Reinstall left or right fender. See *Install Left Fender* on page 15 or *Install Right Fender* on page 16
9. Return unit to operating position.

IMPORTANT: Check all adjustments after first use.

REPLACE UPPER CONTROL ARM

Remove Upper Control Arm

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove one hex bolt and one raised head bolt securing upper control arm to lower control arm. See Figure 91.

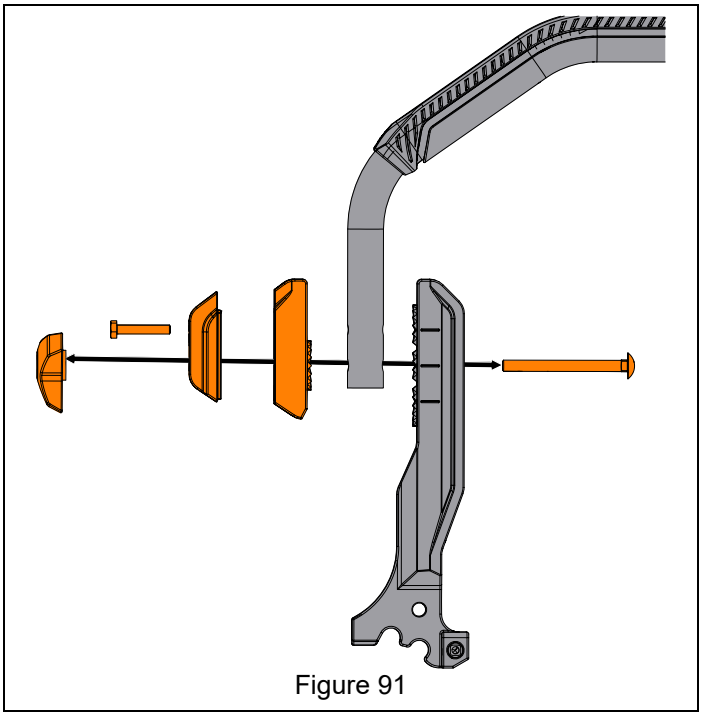


Figure 91

Install Upper Control Arm

1. Secure upper control arm to lower control arm using hardware removed earlier. See Figure 92.

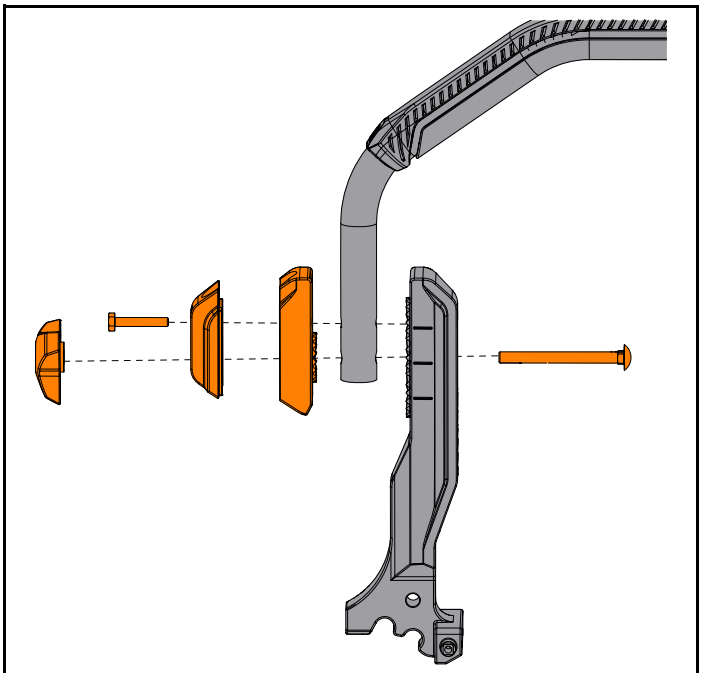


Figure 92

WHEELS AND TIRES

Check Tire Pressure

IMPORTANT: See Specifications in Operator's Manual for recommended tire pressures.

WARNING: AVOID INJURY. Explosive separation of tire and rim parts is possible.

- DO NOT inflate tires above recommended pressure.
- DO NOT stand in front of tire assembly when inflating. Use a clip-on chuck and extension hose long enough to allow you to stand to one side.
- DO NOT mount a tire without proper equipment and experience.

IMPORTANT: Save all parts and hardware for reinstallation.

1. Check tires for damage.
2. Repair or replace any damaged tires. See *Repair and Replace Tires* on page 46.
3. Check tire pressure with an air-pressure gauge.
4. Add or remove air as necessary.

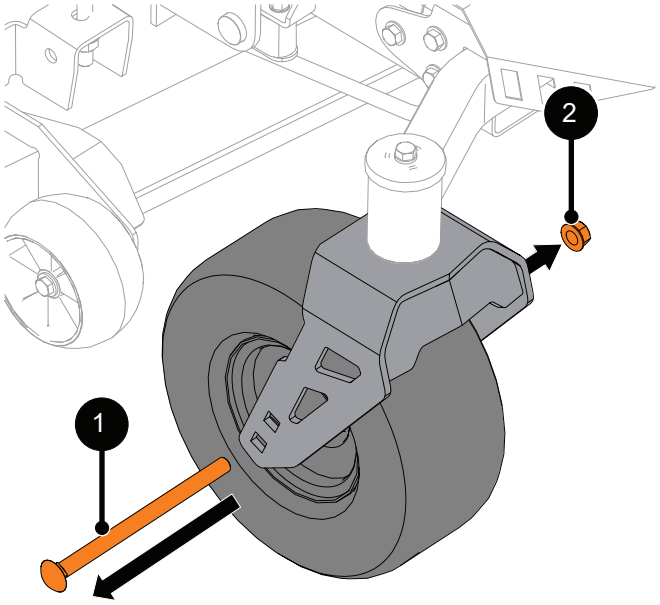
FRONT WHEEL REPLACEMENT

Remove Front Wheel

IMPORTANT: Save all parts and hardware for reinstallation.

See Figure 93.

1. Lift and support front of unit. Ensure jack stands are sturdy and capable of supporting unit. See *Front Lifting* on page 12.
2. Remove carriage bolt and nut securing wheel assembly to caster fork and remove wheel assembly.



1. Carriage Bolt
2. Nut

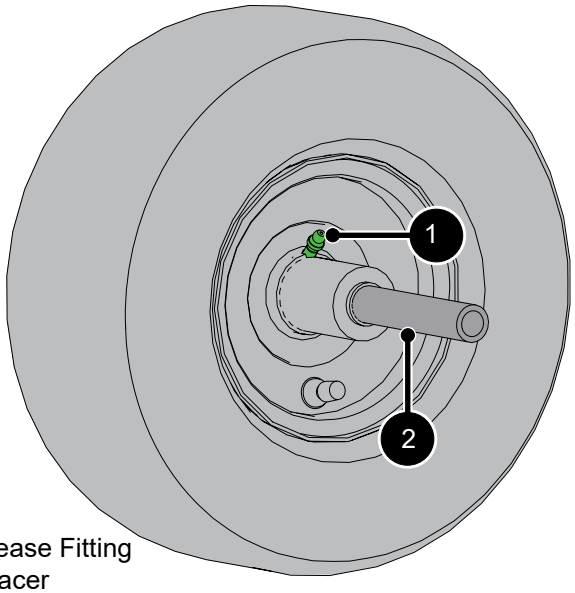
Figure 93

Install Front Wheel

IMPORTANT: Replacement wheel includes tire and bearings.

On reassembly, ensure spacer is positioned correctly.

1. Replace wheel assembly on caster fork, and secure with carriage bolt and nut removed earlier. See Figure 93.
   - Torque nut to 87 N•m (64 lb-ft). DO NOT overtighten.
2. Grease bearings using grease fitting. See Figure 94.



1. Grease Fitting
2. Spacer

Figure 94

FRONT CASTER FORK BEARING REPLACEMENT

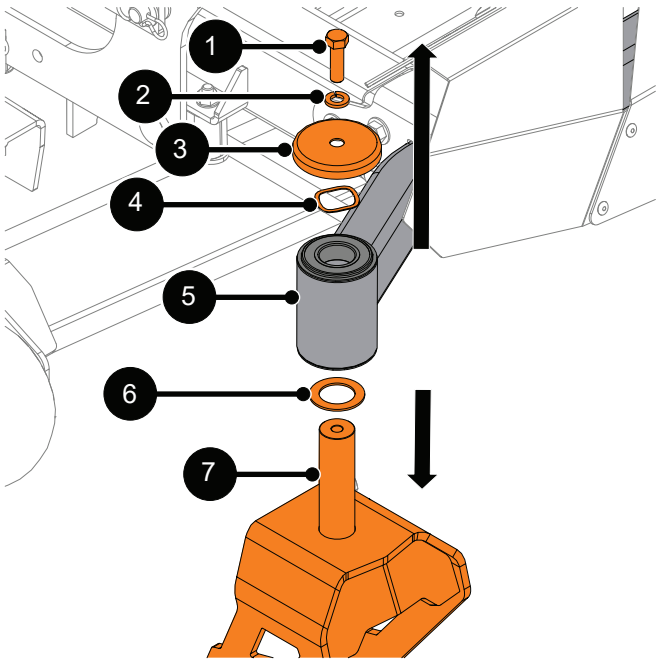
Remove Front Caster Fork Bearings

IMPORTANT: Save all parts and hardware for reinstallation.

1. Remove caster wheel. See *Front Wheel Replacement* on page 43.

See Figure 95.

2. Remove hex bolt and lock washer.
3. Remove bearing shield and wave washer from hub.
4. Slide fork out of hub.



1. Hex Bolt
2. Lock Washer
3. Bearing Shield
4. Wave Washer
5. Hub
6. Shim Washer
7. Fork

Figure 95

5. Remove shim washer and both bearings from hub.

Install Front Caster Fork Bearings

IMPORTANT: Gravely recommends replacing hub bearings in pairs.

1. Install two new bearings. See Figure 96.

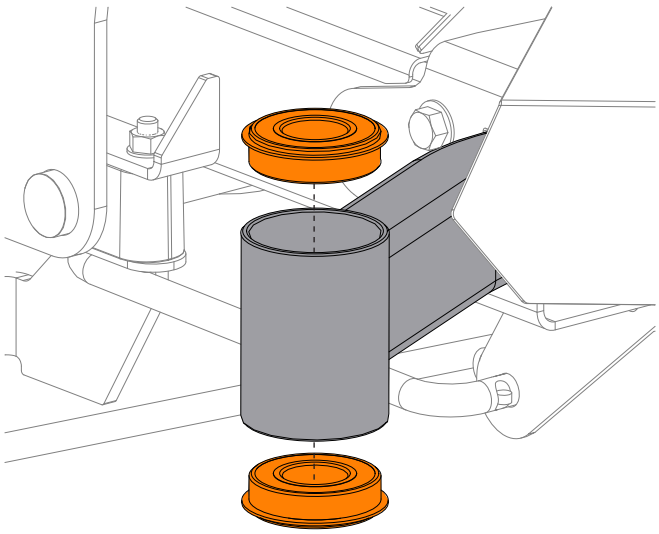
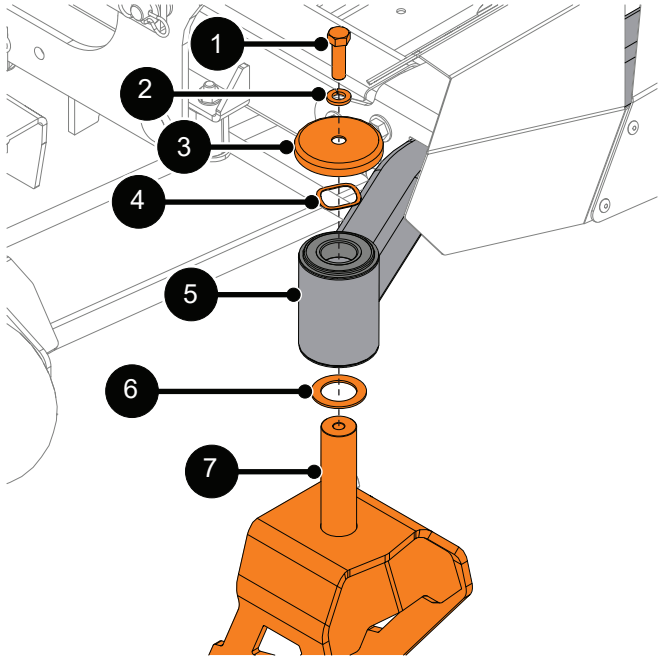


Figure 96

See Figure 97.

NOTICE: Ensure shim washer is positioned correctly during reassembly.

2. Reinstall shim washer and fork.
3. Reinstall wave washer and bearing shield onto hub and secure complete assembly with lock washer and hex bolt removed earlier.
   - Torque hex bolt to 20 N•m (178 lb-in). DO NOT overtighten.
4. Reinstall caster wheel. See *Front Wheel Replacement* on page 43.



1. Hex Bolt
2. Lock Washer
3. Bearing Shield
4. Wave Washer
5. Hub
6. Shim Washer
7. Fork

Figure 97

REAR WHEEL REPLACEMENT

Remove Rear Wheel

IMPORTANT: Save all parts and hardware for reinstallation.

1. Lift and support rear of unit. Ensure jack stands are sturdy and capable of supporting unit. See *Safety Devices* on page 13.
2. Remove four lug nuts and remove rear wheel assembly. See Figure 98.

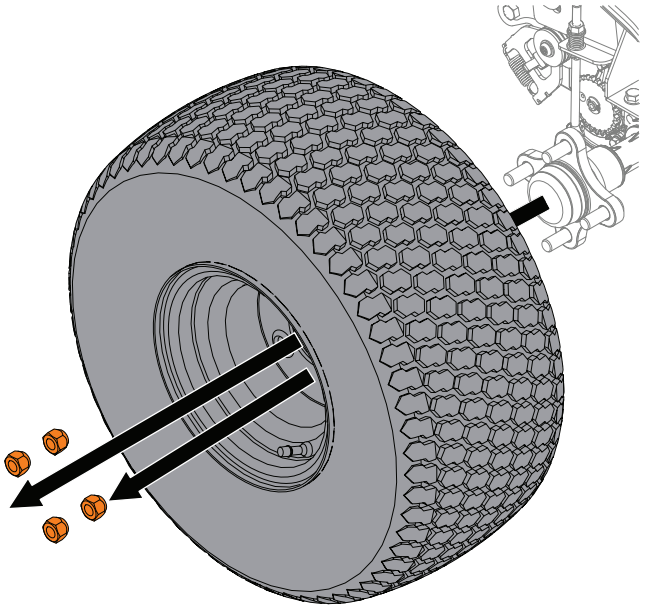


Figure 98

WARNING: AVOID INJURY. Damaged rims can cause air leaks and poor handling. ALWAYS replace damaged rims.

Install Rear Wheel

1. Reinstall rear wheel assembly and secure with lug nuts removed earlier. See Figure 99.
   - Torque lug nuts to 81 N•m – 122 N•m (60 lb-ft – 90 lb-ft). DO NOT overtighten.

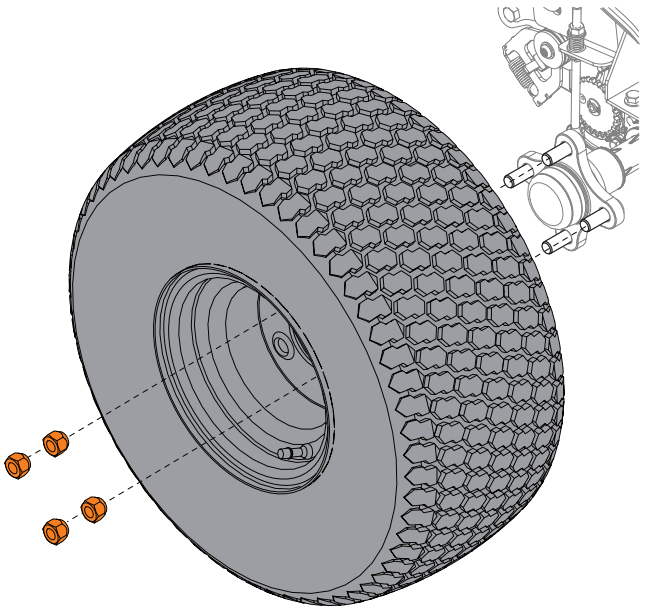


Figure 99

Repair and Replace Tires

See Figure 100.

Tires for this unit are tubeless and all repairs should be done by an authorized tire service dealer with proper equipment and experience.

IMPORTANT: ALWAYS maintain correct tire pressures and never inflate tires above recommended pressure. See Specifications in Operator's Manual for recommended tire pressure.

After replacing one or both tires, always:

- Check tire pressure. See *Check Tire Pressure* on page 43.
- Check height of blades from ground. See *Adjust Blade Pitch* on page 71.

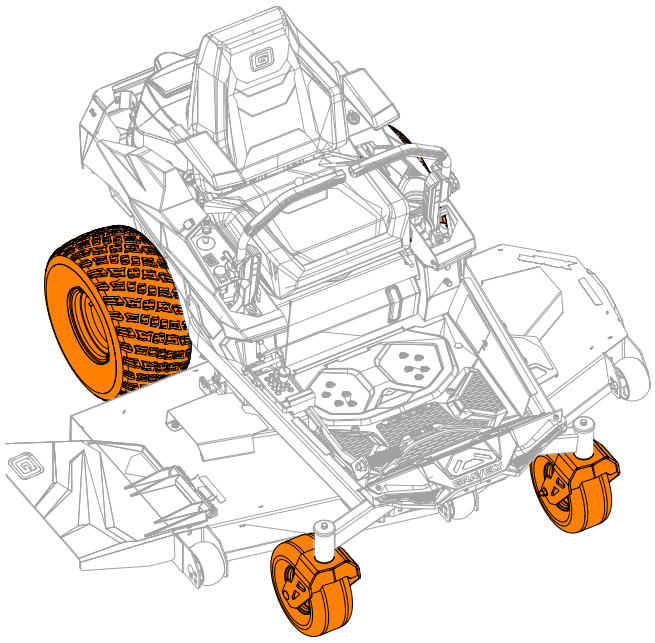


Figure 100

TRANSMISSION

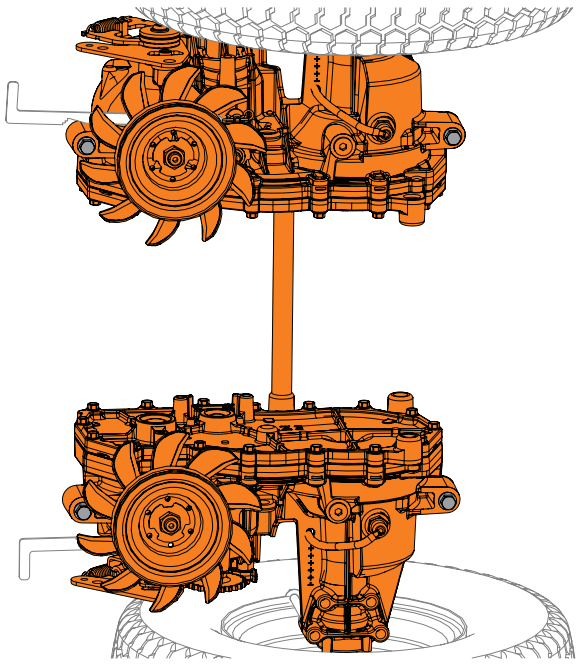


Figure 101

TRANSMISSION ADJUSTMENTS

Adjust Neutral Position - X Models

IMPORTANT: Save all parts and hardware for reinstallation.

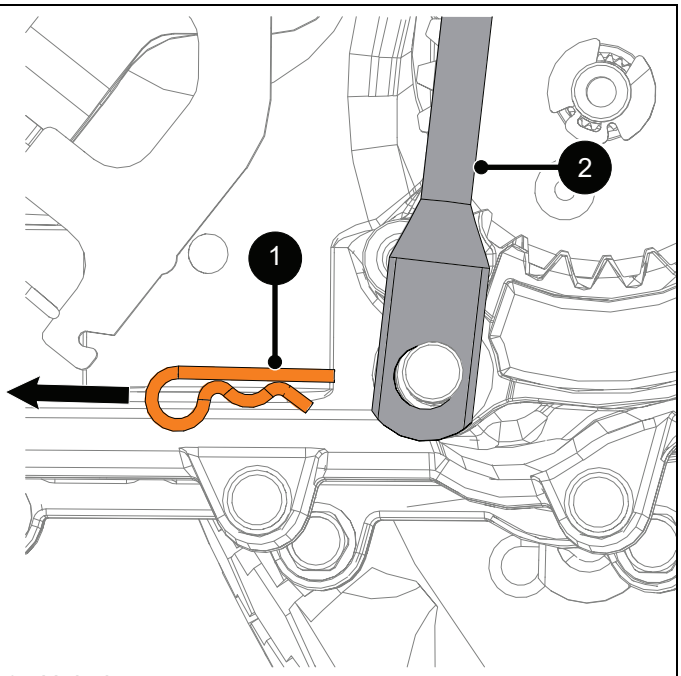
Neutral return mechanism of transaxle forces levers to neutral position when controls are released.

1. Remove rear wheels. See *Remove Rear Wheel* on page 45.

NOTICE: Always adjust BOTH transmissions.

2. Remove hairpin to disconnect parking brake rod. See Figure 102.

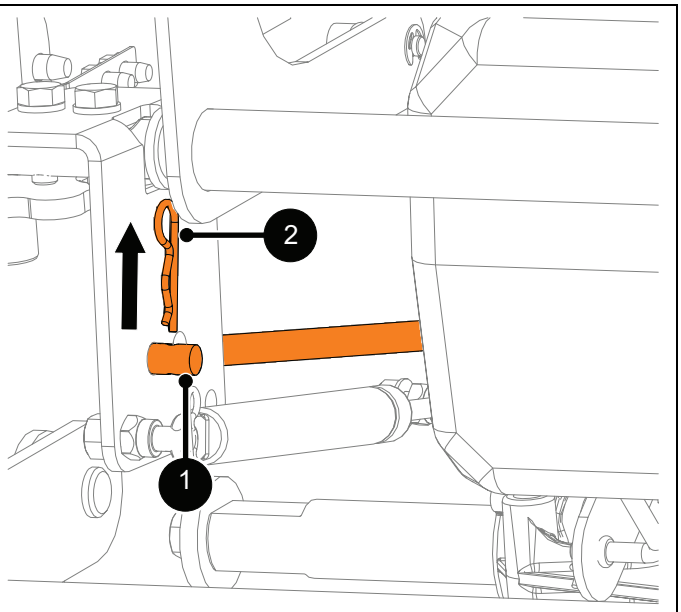
IMPORTANT: Reinstall hairpin into parking brake rod so it is not misplaced.



1. Hairpin
2. Parking Brake Rod

Figure 102

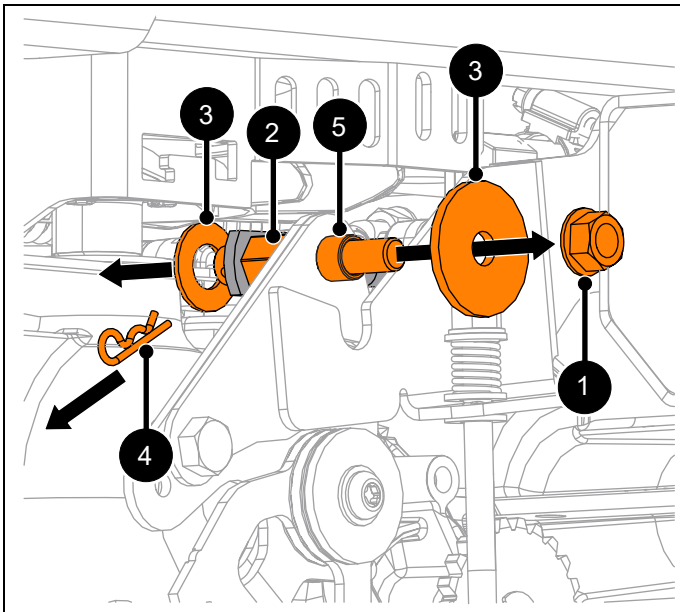
3. Remove hairpin to disconnect steering link rod from control lever. See Figure 103.



1. Steering Link Rod
2. Hairpin

Figure 103

4. Start engine and move throttle lever to maximum speed.
5. Check axle rotation. If axle does not rotate, proceed to Step 6. If axle does rotate, proceed to Step 7.
6. Stop engine. Reconnect steering link rod and adjust mechanical linkage of unit.
7. Observe direction of axle rotation and shut engine off.
8. Remove nut, hairpin, washers, spacer and rod linkage head from drive control lever. See Figure 104.

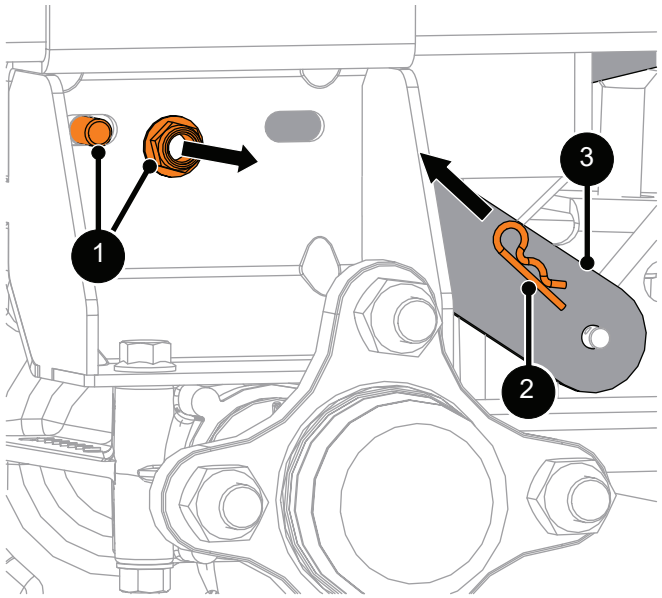


1. Nut
2. Rod Linkage Head
3. Washer (2)
4. Hairpin
5. Spacer

Figure 104

See Figure 105.

9. Remove brake latch bolt, nut and hairpin to remove brake pivot plate.

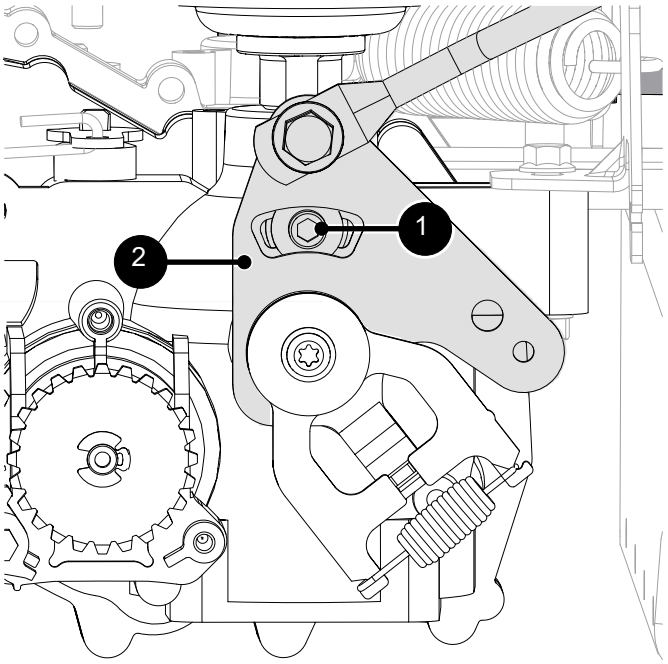


1. Brake Latch Bolt and Nut
2. Hairpin
3. Brake Pivot Plate

Figure 105

See Figure 106.

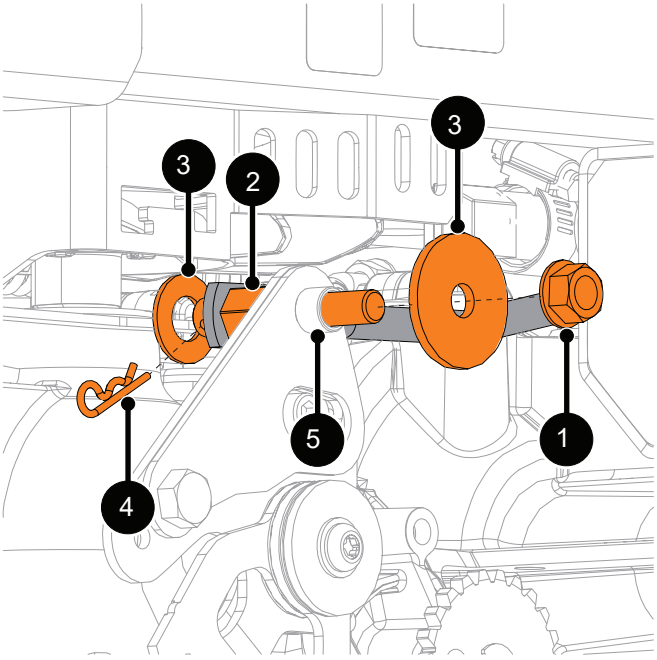
10. Loosen Allen head screw to allow control arm to rotate.
11. Rotate control arm in opposite direction of axle rotation with small 5° increases until axle stops rotating.
12. Torque Allen head screw to 20 N•m (14.8 lb-ft) and repeat steps 4 and 5 until axle does not rotate. DO NOT overtighten.



1. Allen Head Screw
2. Control Arm

Figure 106

13. Reinstall rod linkage head on drive control lever and secure with hardware removed earlier. See Figure 107.



1. Nut
2. Rod Linkage Head
3. Washer (2)
4. Hairpin
5. Rod Linkage Spacer

Figure 107

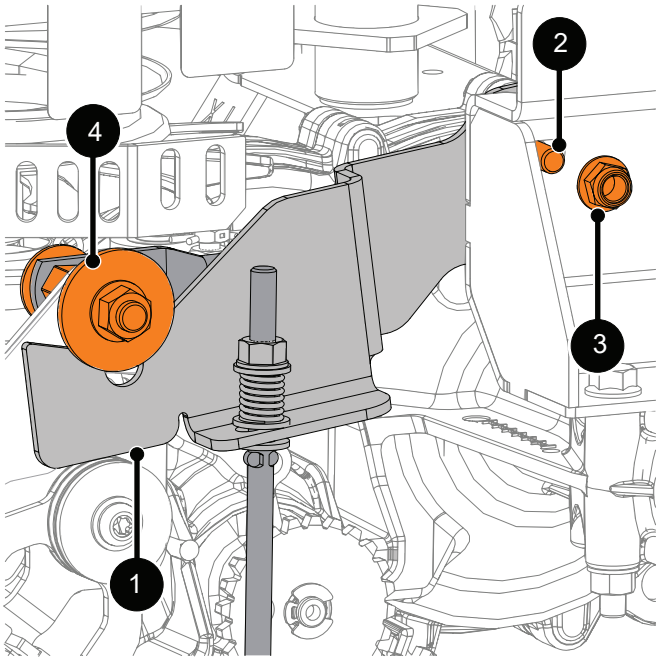
See Figure 108.

14. Reinstall brake pivot plate, brake latch bolt and nut. DO NOT tighten fully.

IMPORTANT: A slot in brake pivot plate allows it to rotate into correct position.

15. With hardware still loose, rotate brake pivot plate up so it engages rod linkage spacer (item 5 in Figure 107). When plate engages spacer, tighten brake nut (item 3 in Figure 108).

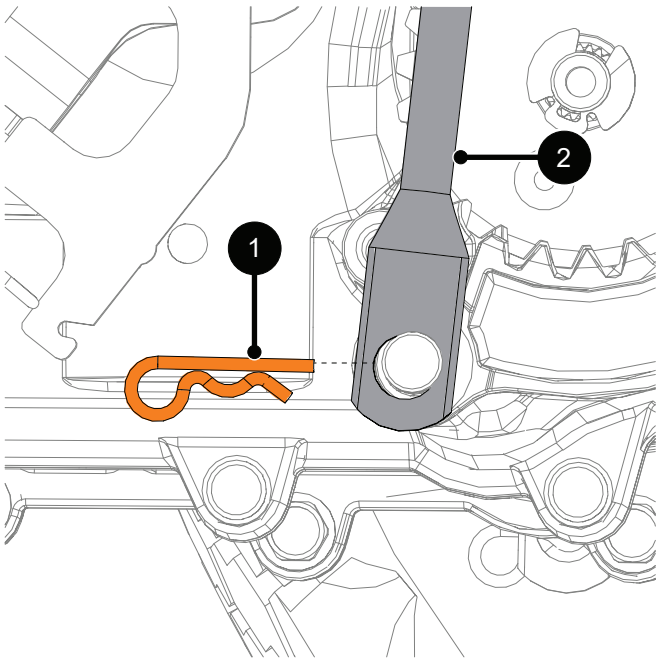
IMPORTANT: This will ensure brake latch is adjusted correctly and transaxle is in neutral position.



1. Brake Pivot Plate
2. Brake Latch Bolt
3. Brake Nut
4. Spacer (shown assembled)

Figure 108

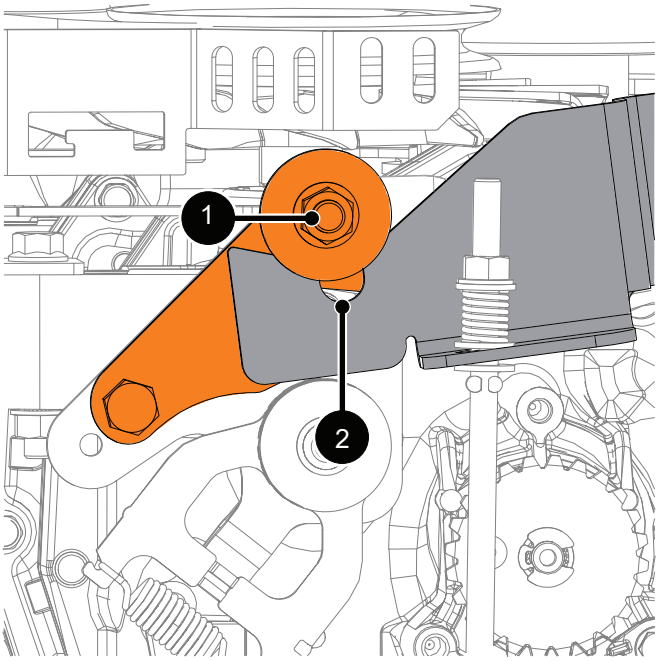
16. Reconnect parking brake rod and secure with hardware removed earlier. See Figure 109.



1. Hairpin
2. Parking Brake Rod

Figure 109

17. Engage and disengage parking brake and ensure pin enters slot correctly. See Figure 110.



1. Pin
2. Slot

Figure 110

18. If not, see *Adjust Parking Brake - X Models* on page 53.
19. Reinstall rear wheels. See *Install Rear Wheel* on page 45.

IMPORTANT: Check all adjustments after first use. If incorrect, remove rear wheels and adjust parking brake again.

Adjust Neutral Position - XL Models

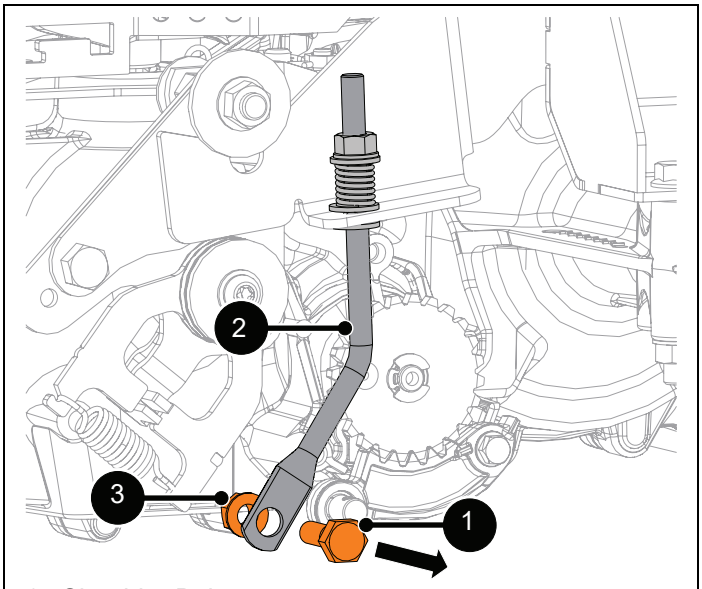
IMPORTANT: Save all parts and hardware for reinstallation.

Neutral return mechanism of transaxle forces levers to neutral position when controls are released.

1. Remove rear wheels. See *Remove Rear Wheel* on page 45.

NOTICE: Always adjust BOTH transmissions.

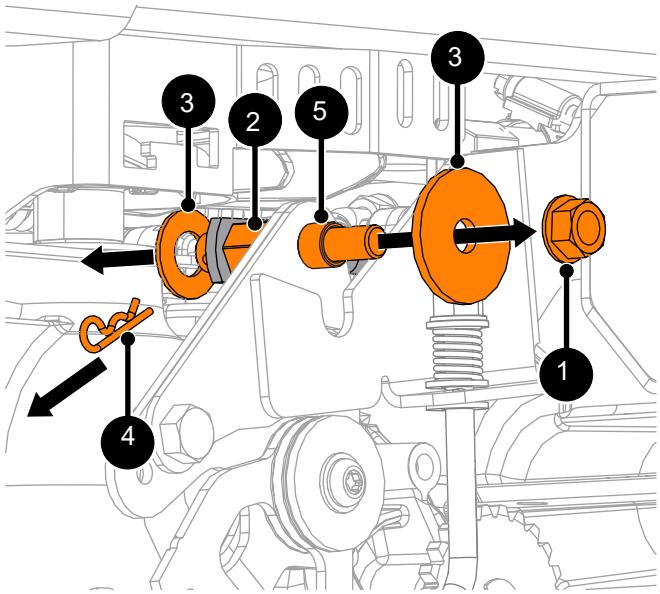
2. Remove shoulder bolt and locking nut to disconnect parking brake rod. See Figure 111.



1. Shoulder Bolt
2. Parking Brake Rod
3. Flange Top Locking Nut

Figure 111

3. Start engine and move throttle lever to maximum speed.
4. Check axle rotation. If axle does not rotate, proceed to Step 6. If axle does rotate, proceed to Step 7.
5. Stop engine. Reconnect steering link rod and adjust mechanical linkage of unit.
6. Observe direction of axle rotation and shut engine off.
7. Remove nut, hairpin, washers, spacer and rod linkage head from drive control lever. See Figure 112.

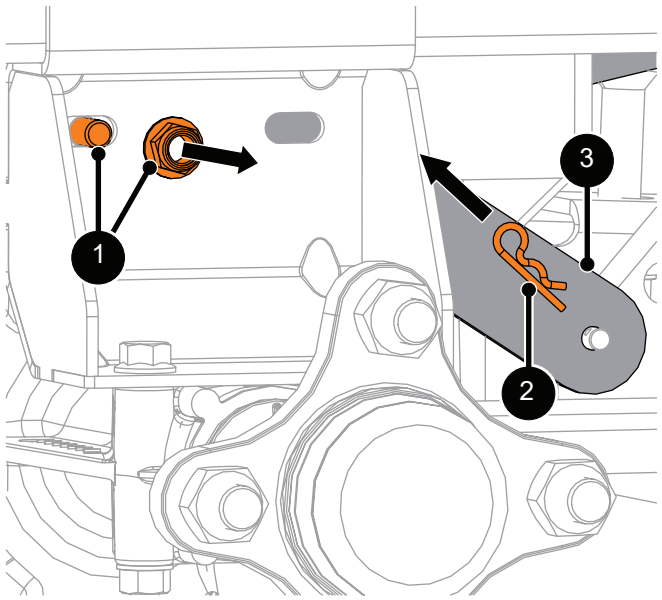


1. Nut
2. Rod Linkage Head
3. Washer (2)
4. Hairpin
5. Spacer

Figure 112

See Figure 113.

8. Remove brake latch bolt, nut and hairpin to remove brake pivot plate.

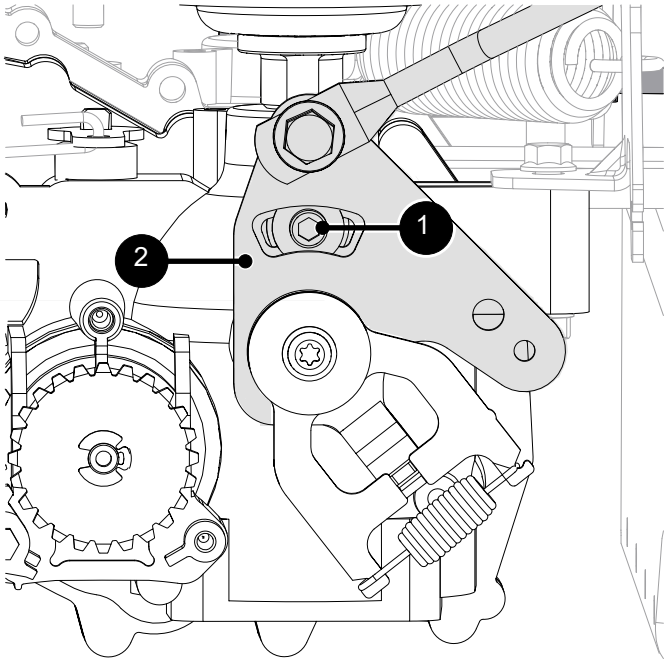


1. Brake Latch Bolt and Nut
2. Hairpin
3. Brake Pivot Plate

Figure 113

See Figure 114.

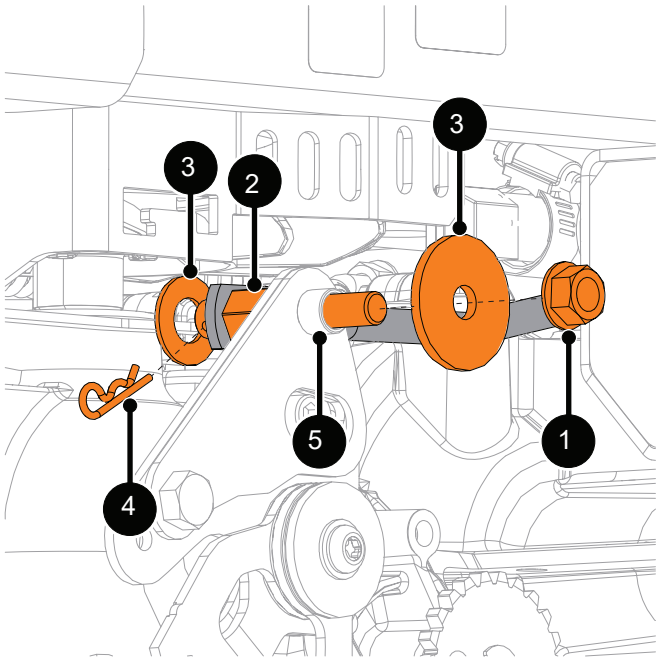
9. Loosen Allen head screw to allow control arm to rotate.
10. Rotate control arm in opposite direction of axle rotation with small 5° increases until axle stops rotating.
11. Torque Allen head screw to 20 N•m (14.8 lb-ft) and repeat steps 4 and 5 until axle does not rotate. DO NOT overtighten.



1. Allen Head Screw
2. Control Arm

Figure 114

12. Reinstall rod linkage head on drive control lever and secure with hardware removed earlier. See Figure 115.



1. Nut
2. Rod Linkage Head
3. Washer (2)
4. Hairpin
5. Rod Linkage Spacer

Figure 115

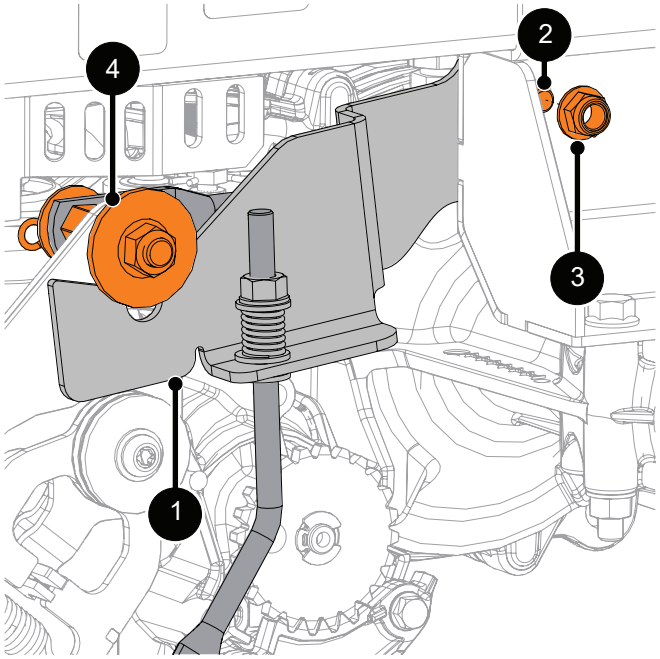
See Figure 116.

13. Reinstall brake pivot plate, brake latch bolt and nut. DO NOT tighten fully.

IMPORTANT: A slot in brake pivot plate allows it to rotate into correct position.

14. With hardware still loose, rotate brake pivot plate up so it engages rod linkage spacer (item 5 in Figure 115). When plate engages spacer, tighten brake nut (item 3 in Figure 113).

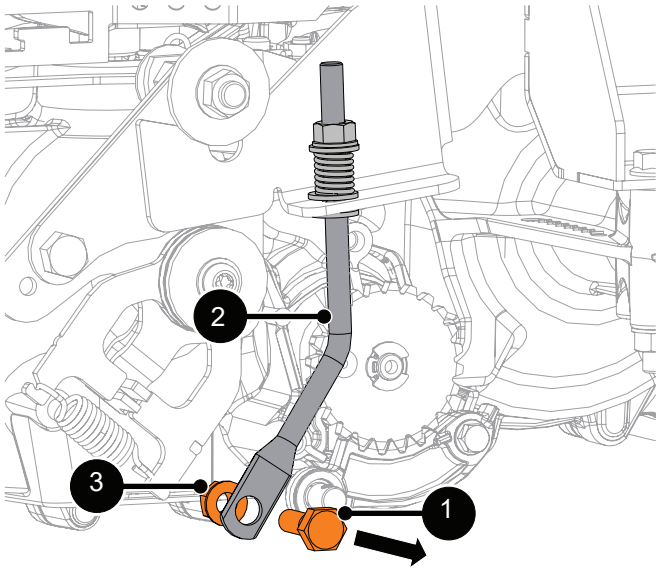
IMPORTANT: This will ensure brake latch is adjusted correctly and transaxle is in neutral position.



1. Brake Pivot Plate
2. Brake Latch Bolt
3. Brake Nut
4. Spacer (shown assembled)

Figure 116

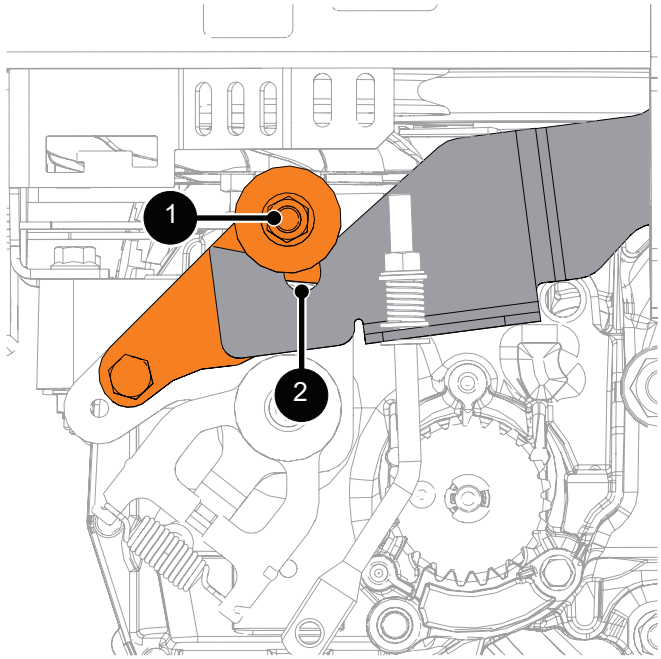
15. Reconnect parking brake rod and secure with hardware removed earlier. See Figure 117.



1. Shoulder Bolt
2. Parking Brake Rod
3. Flange Top Locking Nut

Figure 117

16. Engage and disengage parking brake and ensure pin enters slot correctly. See Figure 118.



1. Pin
2. Slot

Figure 118

17. If not, see *Adjust Parking Brake - XL Models* on page 54.
18. Reinstall rear wheels. See *Install Rear Wheel* on page 45.

IMPORTANT: Check all adjustments after first use. If incorrect, remove rear wheels and adjust parking brake again.

Adjust Parking Brake - X Models

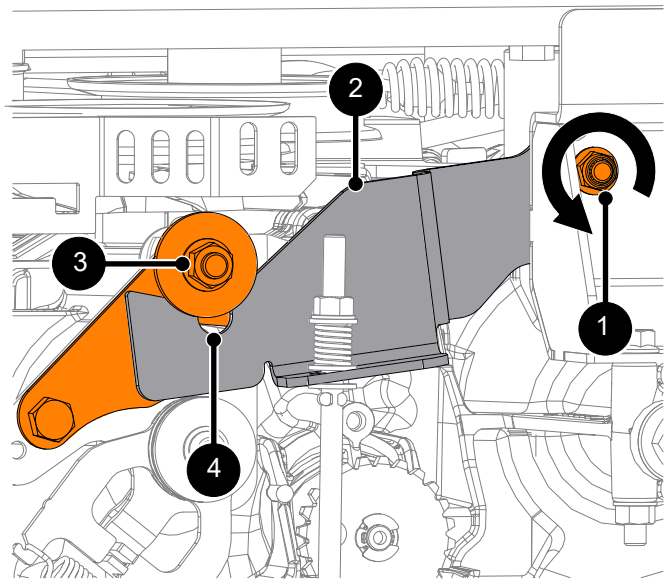
IMPORTANT: Save all parts and hardware for reinstallation.

After adjustments, parking brake should prevent machine from moving on a slope of 16 degrees with operator in position.

1. Remove rear wheels. See *Remove Rear Wheel* on page 45.

See Figure 119.

2. Loosen adjustment nut and move lever until pin enters slot correctly.
3. Tighten adjustment nut.



1. Adjustment Nut
2. Lever
3. Pin
4. Slot

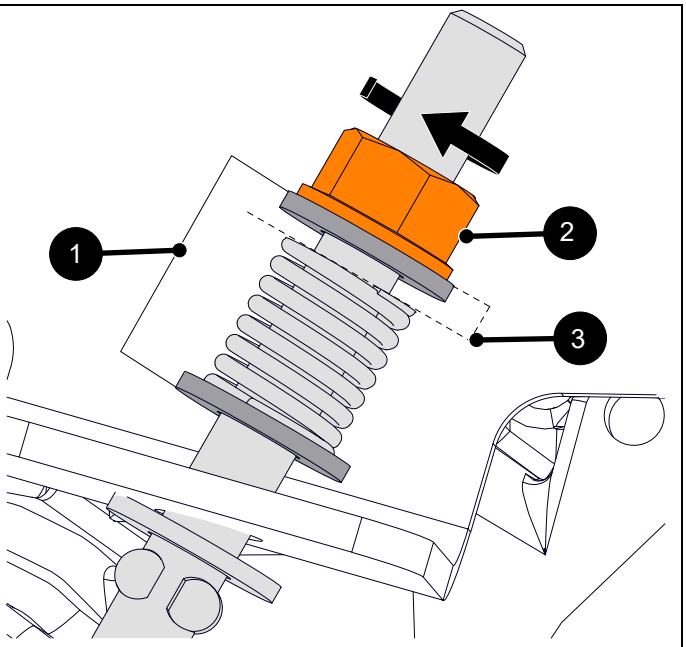
Figure 119

See Figure 120.

4. Adjust spring length using adjustment nut (item 2) to 7/8”-1.00” measuring from washer to washer (item 1) while parking brake is disengaged.
5. Measure amount of spring compression, washer to washer, when parking break is engaged. Spring should compress a minimum of 3 mm – 4 mm (1/8" – 5/32") from disengaged measurement.
6. Test brake by rotating wheel both forward AND reverse. If brake does not properly engage, tighten nut 1/2 turn and recheck.

NOTICE: Parking brake is adjusted correctly when it holds both transmissions from moving and activates safety switch.

IMPORTANT: Check all adjustments after first use.



1. Disengaged Measurement.
2. Adjustment Nut
3. Engaged Measurement

Figure 120

NOTICE: Parking brake is adjusted correctly when it holds both transmissions from moving and activates safety switch.

IMPORTANT: Check all adjustments after first use.

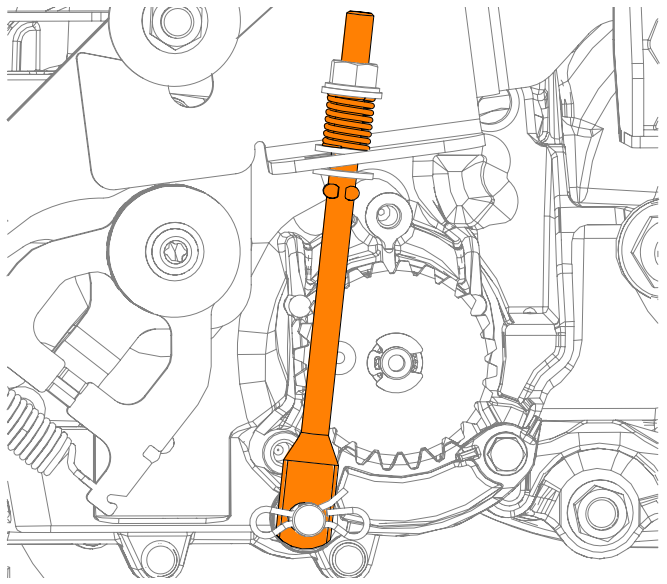


Figure 121

Adjust Parking Brake - XL Models

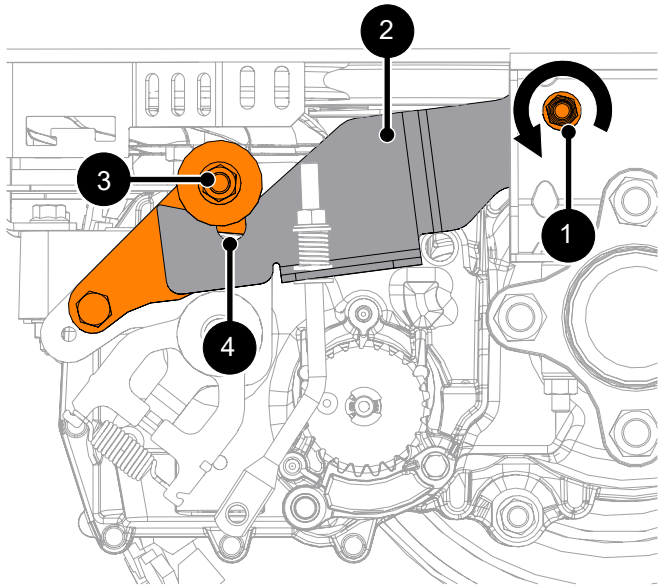
IMPORTANT: Save all parts and hardware for reinstallation.

After adjustments, parking brake should prevent machine from moving on a slope of 16 degrees with operator in position.

1. Remove rear wheels. See *Remove Rear Wheel* on page 45.

See Figure 122.

2. Loosen adjustment nut and move lever until pin enters slot correctly.
3. Tighten adjustment nut.



1. Adjustment Nut
2. Lever
3. Pin
4. Slot

Figure 122

See Figure 123.

4. After completing adjustments, reassemble and reinstall all parts and check for proper operation.
5. Check for spring compression of 3 mm – 4 mm (1/8" – 5/32") from free length.

NOTICE: Parking brake is adjusted correctly when it holds both transmissions from moving and activates safety switch.

IMPORTANT: Check all adjustments after first use.

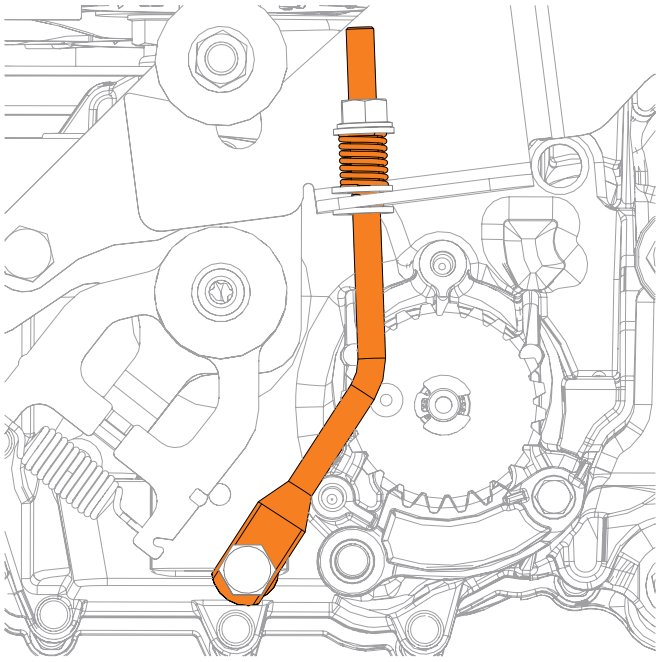


Figure 123

STEERING DAMPER REPLACEMENT

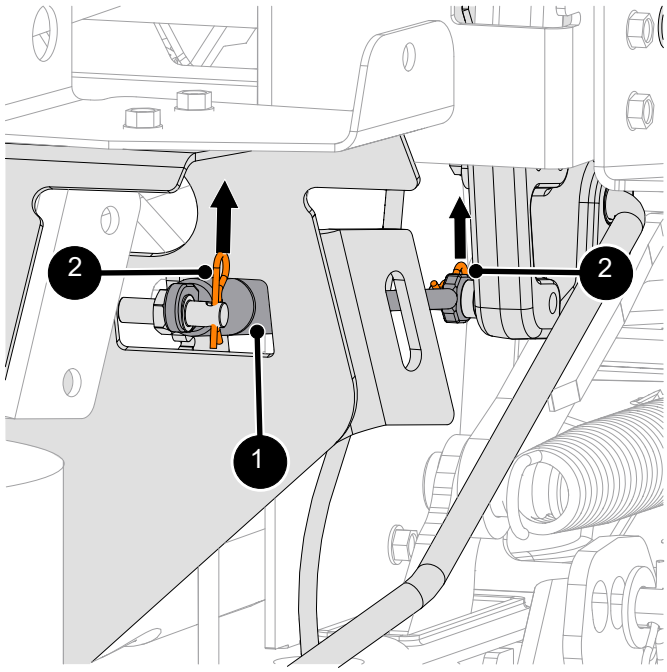
IMPORTANT: Save all parts and hardware for reinstallation.

Remove Steering Damper

See Figure 124.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove hairpins from both ends of steering damper and remove steering damper.

IMPORTANT: Reinstall hairpins into pins so they are not misplaced.



1. Steering Damper
2. Hairpins

Figure 124

Install Steering Damper

See Figure 124.

1. Install steering damper with piston crown facing rear section of unit, and secure with hairpins on both ends.
2. Return to operating position.

GROUND DRIVE BELT REPLACEMENT

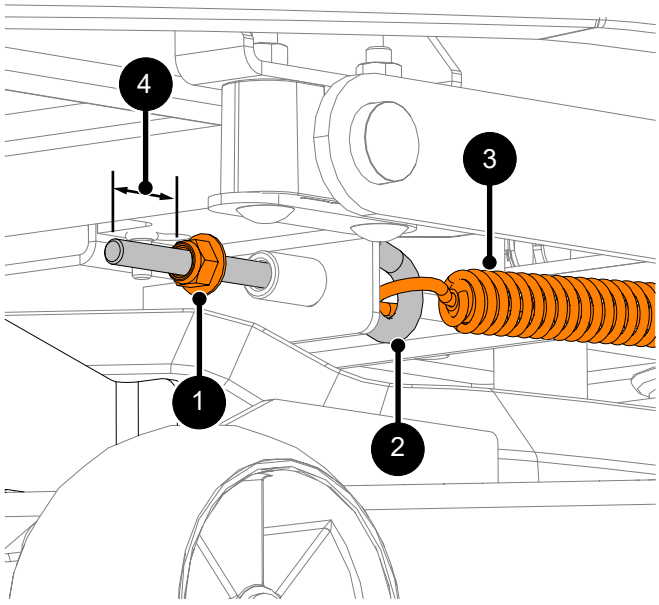
Remove Ground Drive Belt

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Remove deck drive belt. See *Remove Deck Drive Belt* on page 75.
3. Set deck at lowest position.

See Figure 125.

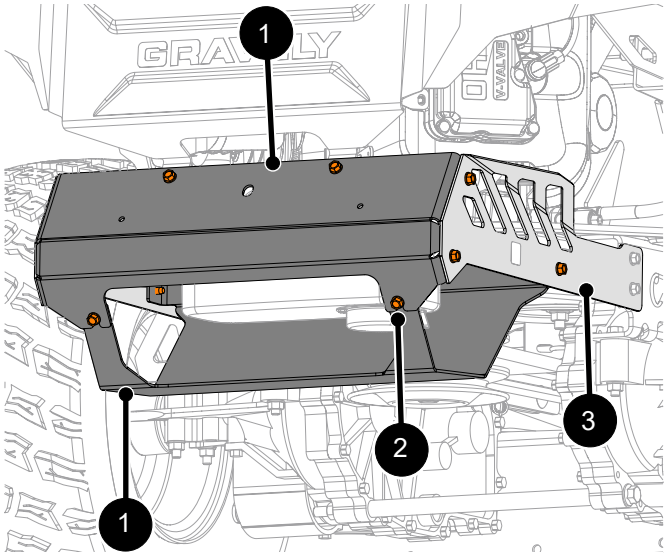
4. Measure and note length of eye bolt threads beyond hex nut.
5. Loosen nut on eye bolt and disconnect idler arm spring.



1. Nut
2. Eye Bolt
3. Idler Arm Spring
4. 61 mm (2 13/16")

Figure 125

6. Remove ten tapping screws securing heat shield. Remove heat shield. See Figure 126.



1. Heat Shield
2. Tapping Screws
3. Shield Arm

Figure 126

7. Remove clutch stop bracket, See *Clutch Stop Bracket Replacement* on page 30.
8. Disconnect clutch pigtail.
9. Remove ground drive belt.

IMPORTANT: Route belt over top of pulleys for easiest removal.

Install Ground Drive Belt

1. Reinstall ground drive belt. See Figure 127.

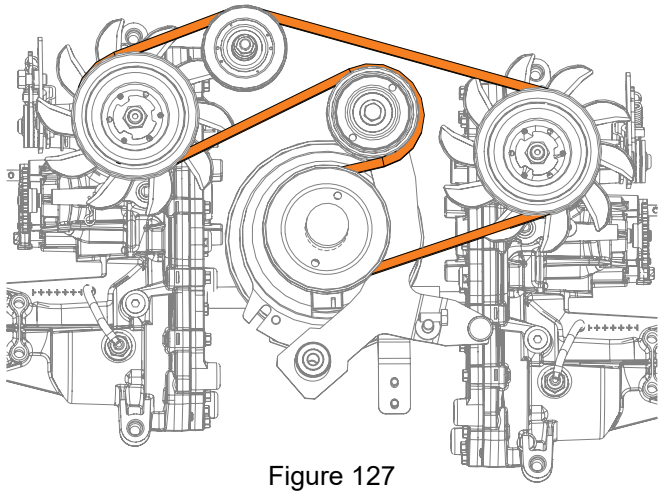
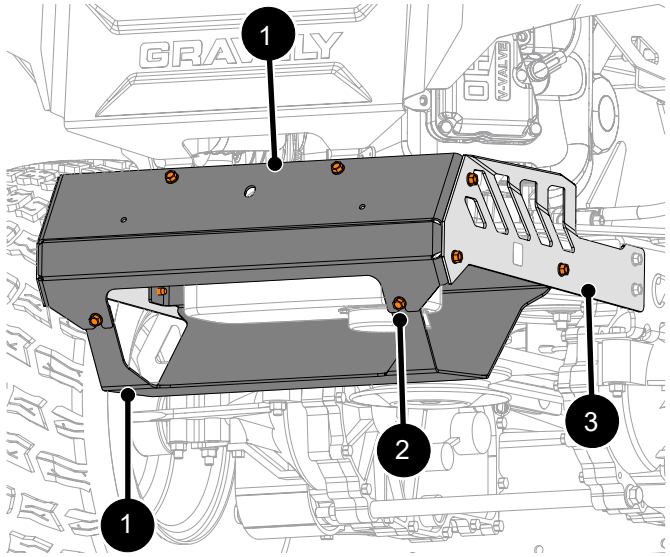


Figure 127

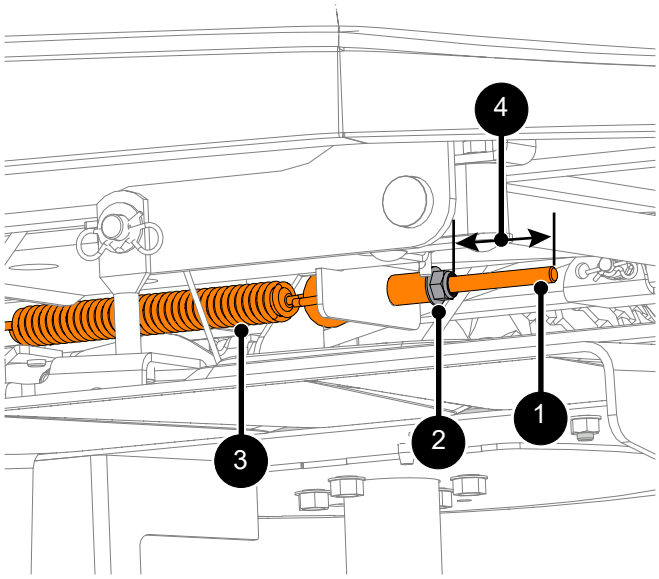
2. Reconnect clutch pigtail.
3. Reinstall clutch stop bracket. See *Clutch Stop Bracket Replacement* on page 30.
4. Reinstall heat shield and secure with two tapping screws. See Figure 128.



1. Heat Shield
2. Tapping Screws
3. Shield Arm

Figure 128

5. Reconnect idler arm spring to eye bolt and secure eye bolt with nut. Tighten until nut meets previously measured value or 61 mm (2 13/16"). See Figure 129.



1. Eye Bolt
2. Nut
3. Idler Spring
4. Measured value or 61 mm (2 13/32")

Figure 129

6. Reinstall deck drive belt. See *Install Deck Drive Belt* on page 75.
7. Return unit to operating position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

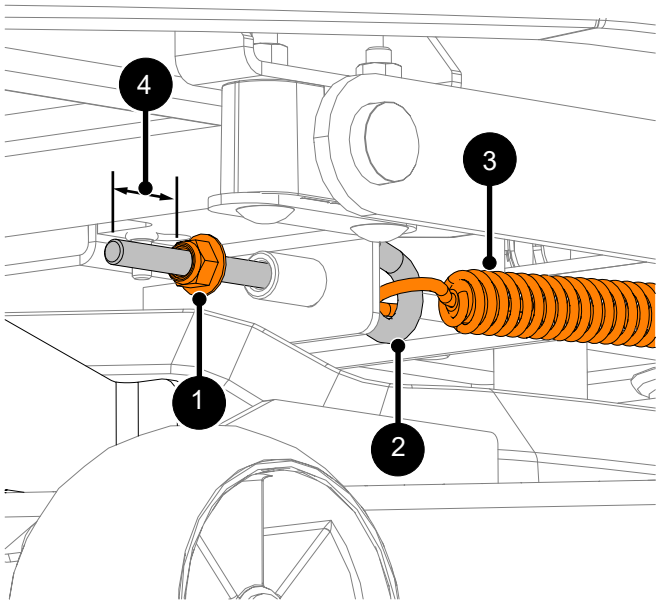
GROUND DRIVE BELT IDLER ARM BEARING REPLACEMENT

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.
2. Set deck at lowest position.

See Figure 130.

3. Measure and note length of eye bolt threads beyond hex nut.
4. Loosen nut on eye bolt and disconnect idler arm spring to remove tension from ground drive belt.

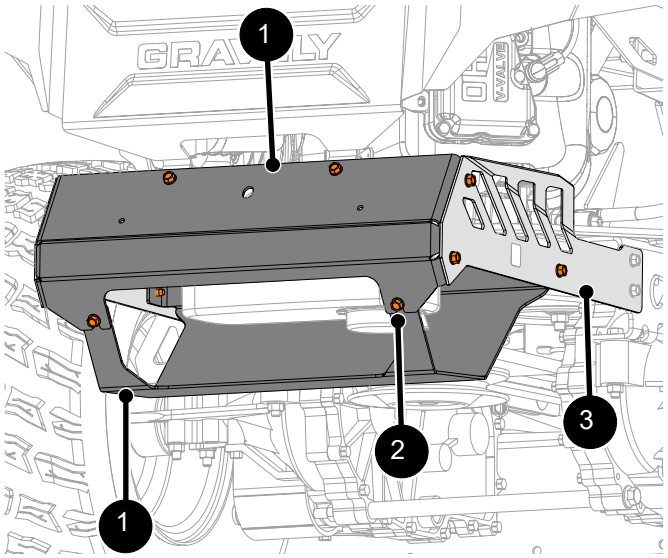


1. Nut
2. Eye Bolt
3. Idler Arm Spring
4. 61 mm (2 13/16")

Figure 130

See See Figure 131.

5. Remove two tapping screws and heat shield.
6. Remove two tapping screws and clutch stop bracket.



1. Heat Shield
2. Tapping Screws
3. Shield Arm

Figure 131

7. Disconnect clutch pigtail.
8. Remove nut and idler arm, noting orientation of components. See Figure 132.

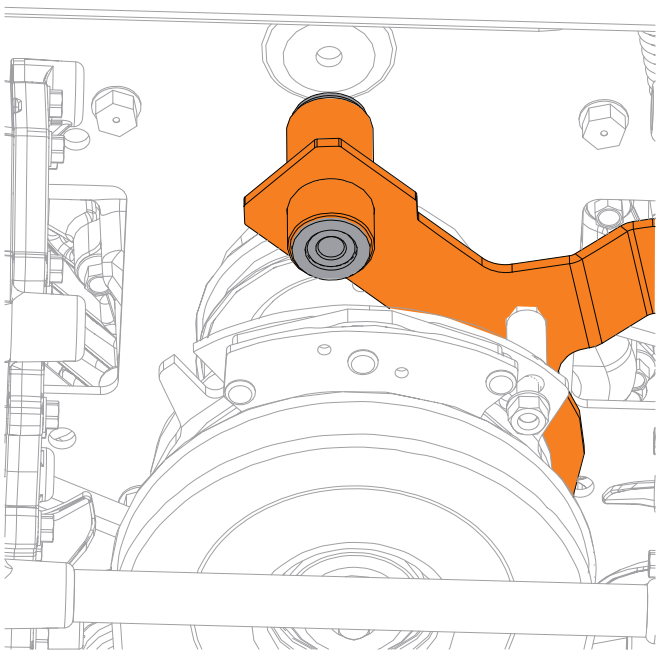
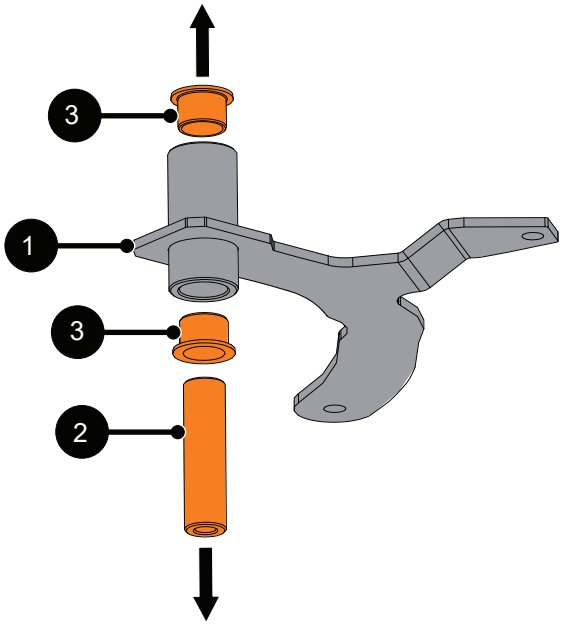


Figure 132

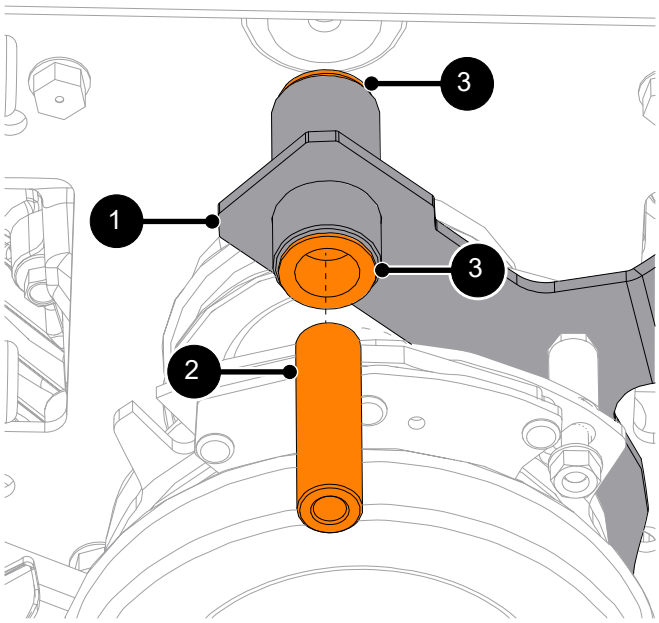
9. Inspect spacer and replace if required. Replace bearings. See Figure 133.



1. Idler Arm
2. Spacer
3. Bearings

Figure 133

10. Reinstall idler arm. See Figure 134.



1. Idler Arm
2. Spacer
3. Bearings

Figure 134

11. Reinstall idler arm attachment bracket and secure with hardware removed earlier. Tighten nuts. See Figure 135.

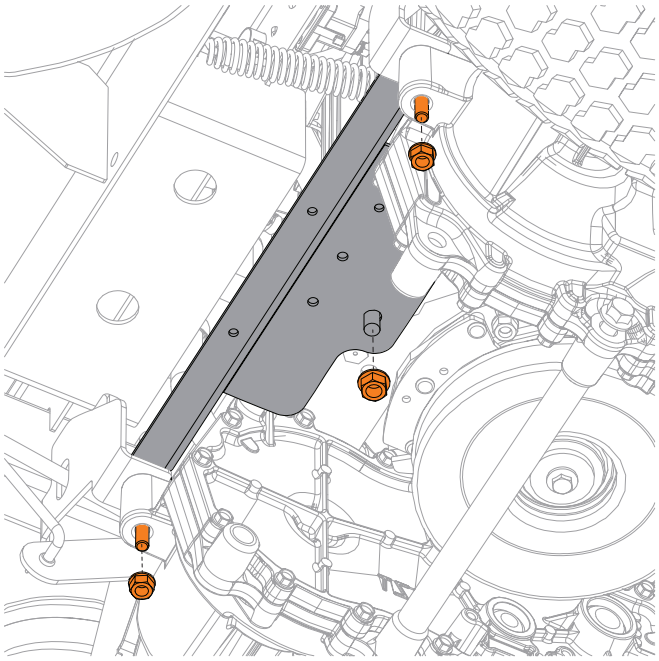


Figure 135

12. Verify belt is engaged in pulleys. See *Install Ground Drive Belt* on page 56.

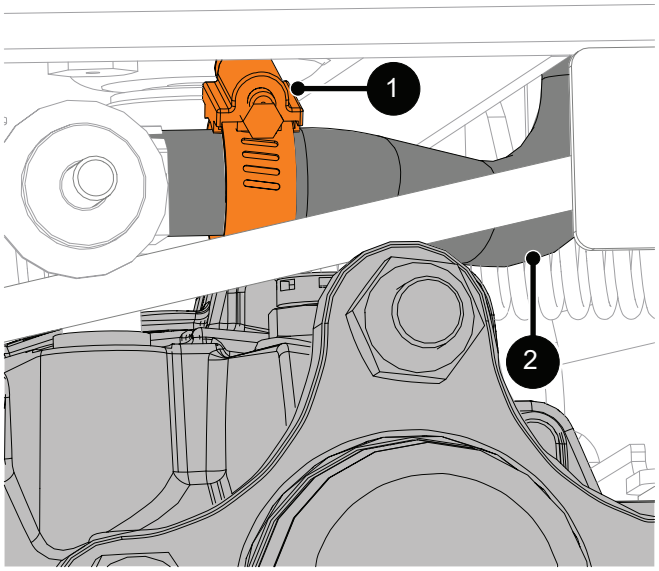
TRANSMISSION REPLACEMENT

Remove Transmission

IMPORTANT: Save all parts and hardware for reinstallation.

For XL Models only, see *Hydraulic Transmission oil change - XL models only* on page 68.

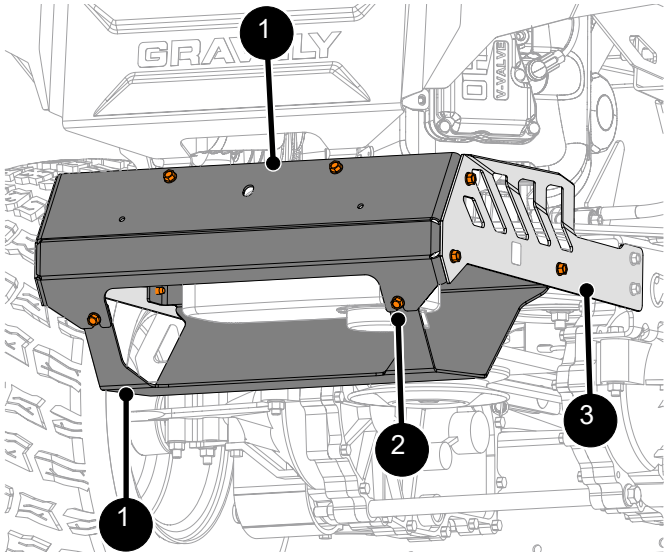
1. Place unit in service position. See *Service Position* on page 10.
2. Lift and support rear part of unit. Ensure jack stands are sturdy and capable of supporting unit.
3. Remove rear wheel on required side. See *Rear Wheel Replacement* on page 45.
4. Loosen hose clamp from top of transmission and remove hose from transmission. See Figure 136.



1. Hose Clamp
2. Hose

Figure 136

5. Remove two tapping screws and heat shield. See Figure 137.

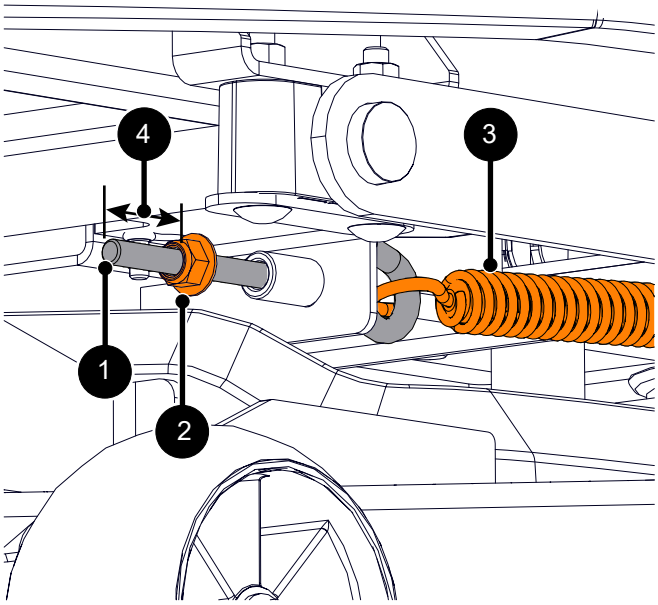


1. Heat Shield
2. Tapping Screws
3. Shield Arm

Figure 137

See Figure 138.

6. Loosen tension of ground drive belt on transmissions:
   - Measure and note length of eye bolt threads beyond hex nut.
   - Loosen nut and remove idler spring.



1. Eye Bolt
2. Nut
3. Idler Spring
4. Measure Length

Figure 138

7. Remove ground drive belt from pulley of required side. See Figure 139.

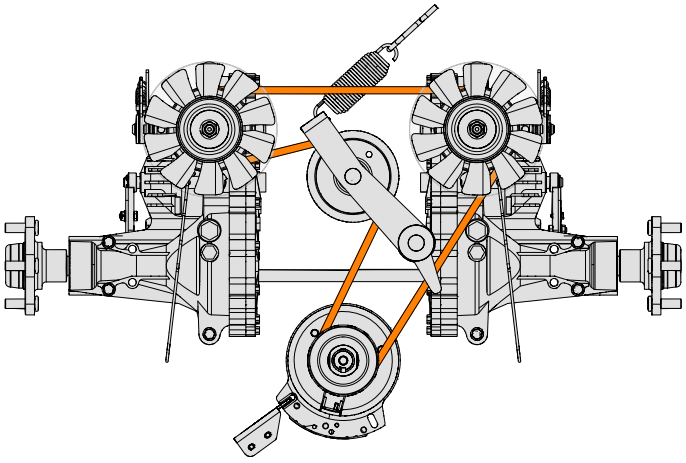
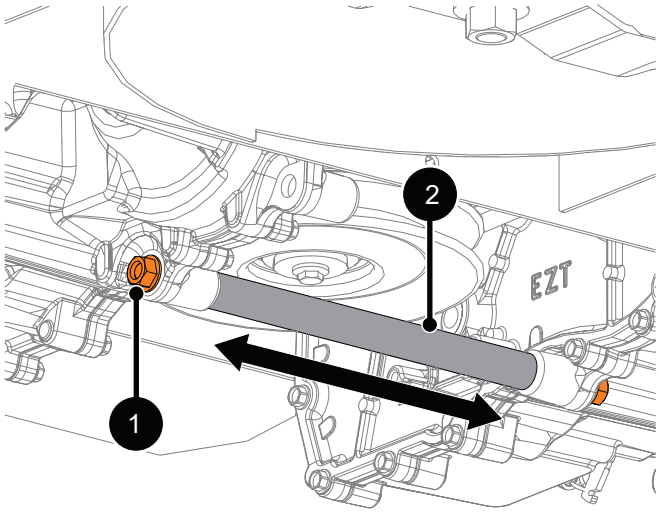


Figure 139

8. Remove hex bolt from connection rod and remove rod from transmission. See Figure 140.

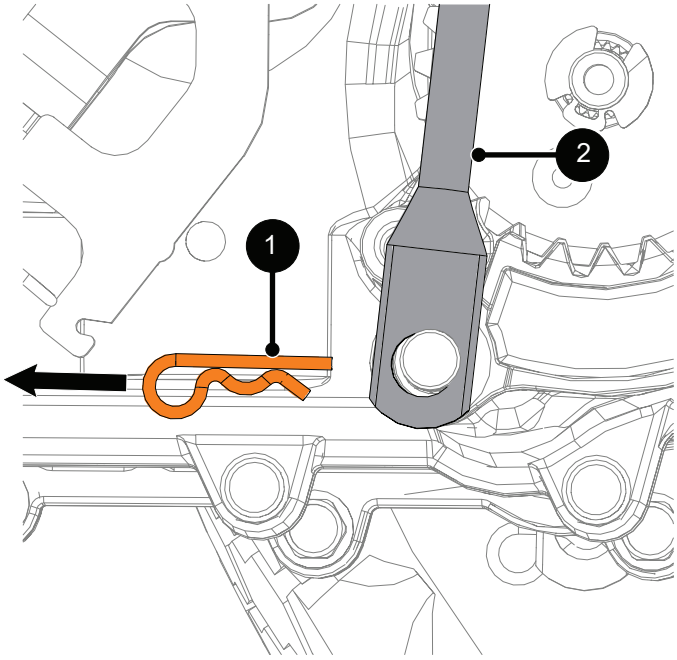


1. Hex Bolt
2. Connection Rod

Figure 140

9. For X models, remove hairpin to disconnect parking brake rod. See Figure 141.

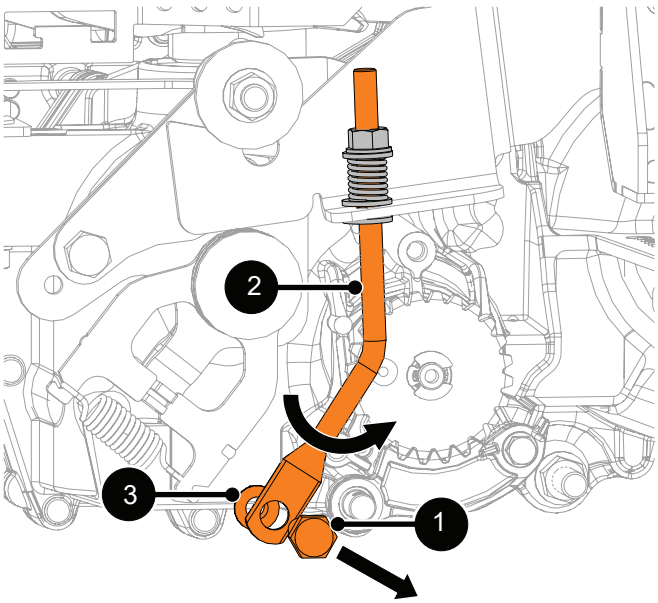
IMPORTANT: Reinstall hairpin so it is not misplaced.



1. Hairpin
2. Parking Brake Rod

Figure 141

10. For XL models, remove shoulder bolt and locking nut to disconnect parking brake rod. See Figure 142.

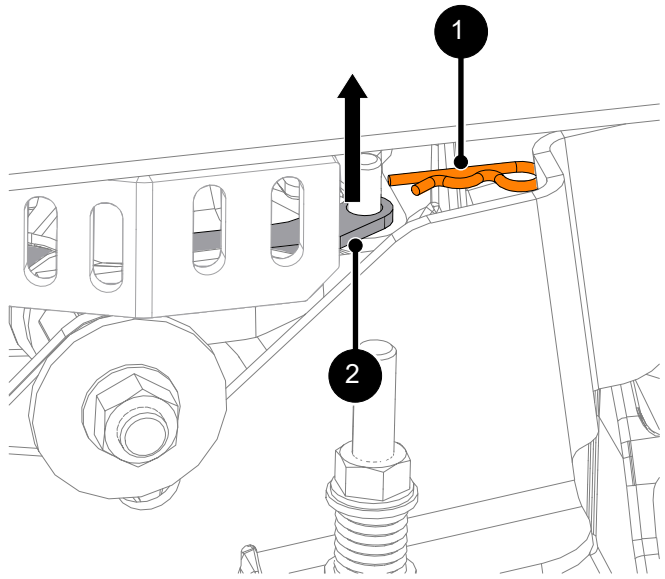


1. Shoulder Bolt
2. Parking Brake Rod
3. Flange Top Locking Nut

Figure 142

11. Remove hairpin and disconnect control arm. See Figure 143.

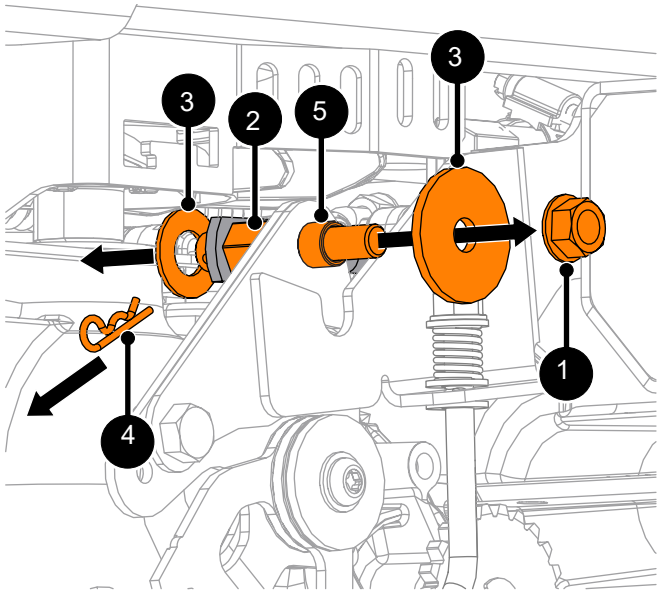
IMPORTANT: Reinstall hairpin so it is not misplaced.



1. Hairpin
2. Control Arm

Figure 143

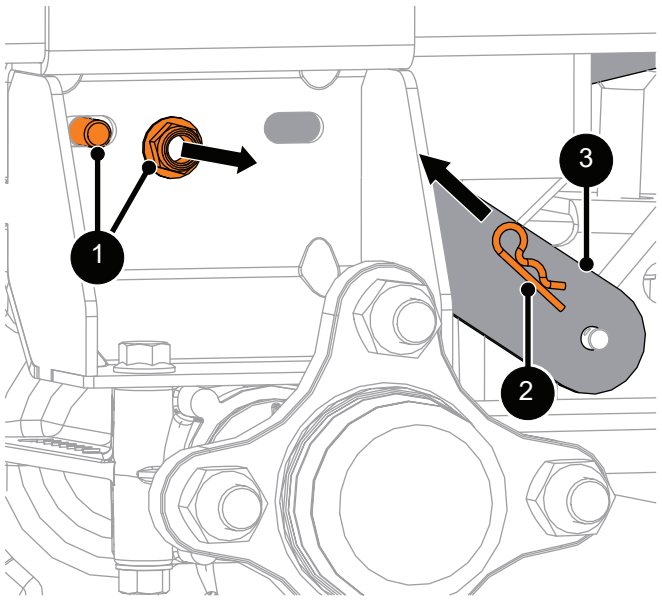
12. Remove nut, hairpin, washers, spacer and rod linkage head from drive control lever. See Figure 144.



1. Nut
2. Rod Linkage Head
3. Washer (2)
4. Hairpin
5. Spacer

Figure 144

13. Remove brake latch bolt, nut and hairpin to remove brake pivot plate. See Figure 145.



1. Brake Latch Bolt and Nut
2. Hairpin
3. Brake Pivot Plate

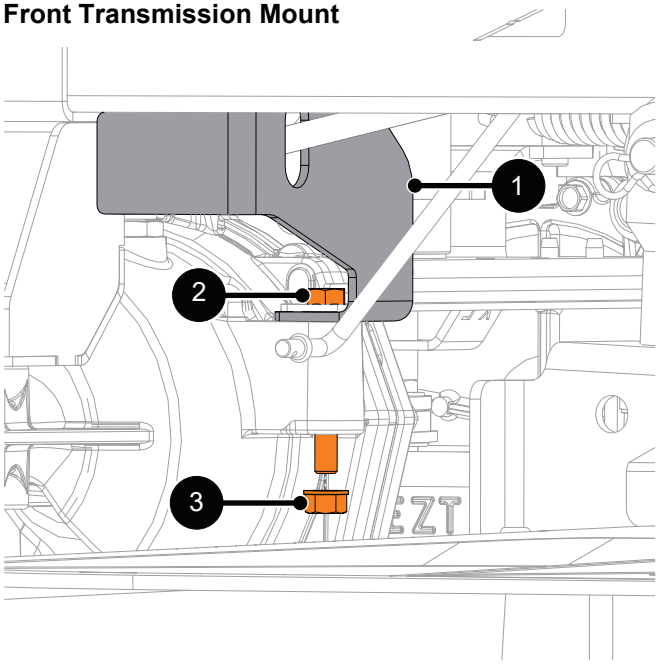
Figure 145

IMPORTANT: Each transmission is supported by front and rear brackets that are part of frame weldment, and attached to brackets with two hex bolts. Transmissions are also attached by two hex bolts located in center around output shaft.

See Figures 146, 147, and 148.

14. Carefully loosen and remove all hardware from brackets while supporting transmission.
15. Carefully lift and remove transmission.

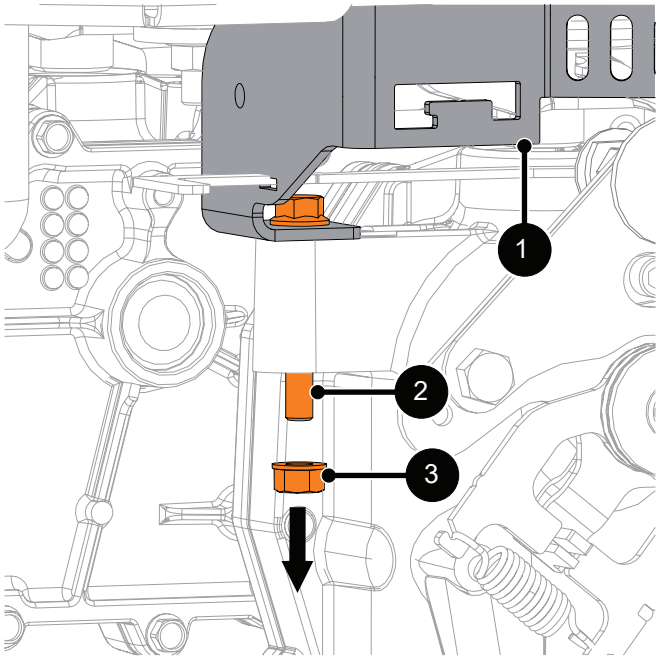
Front Transmission Mount



1. Front Transmission Support Bracket
2. Hex Bolt
3. Nut

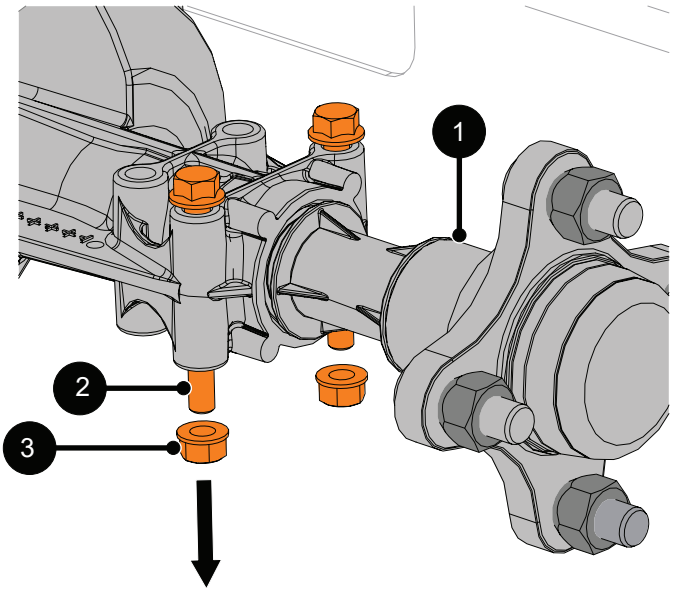
Figure 146

Rear Transmission Mount



1. Rear Transmission Support Bracket
2. Hex Bolt
3. Nut

Figure 147



1. Transmission
2. Hex Bolt
3. Nut

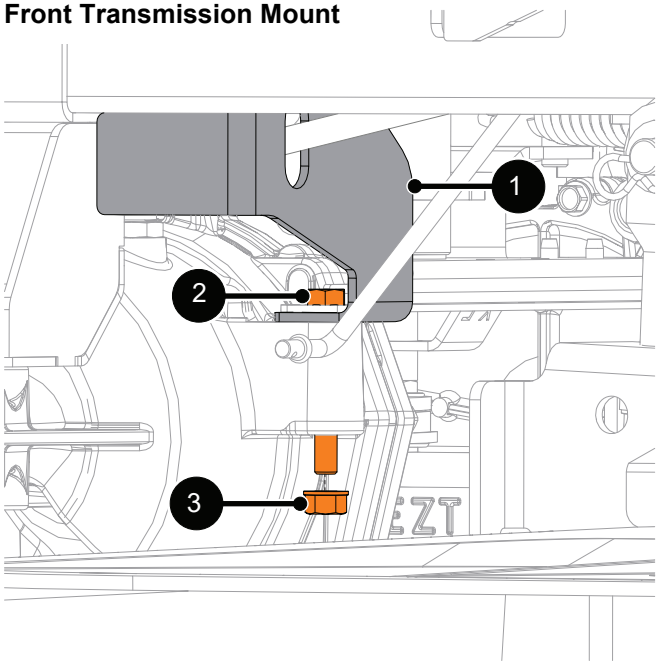
Figure 148

Install Transmission

See Figures 148, 149, and 150.

1. While supporting transmission in position on front and rear brackets, secure to brackets with hardware previously removed and carefully tighten nuts.
   - Torque nuts to 20 N•m (178 lb-in). DO NOT overtighten.

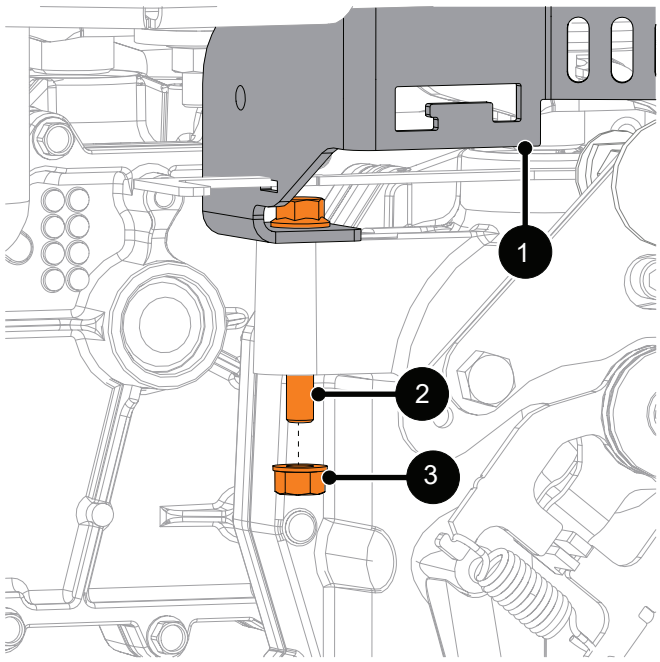
Front Transmission Mount



1. Front Transmission Support Bracket
2. Hex Bolt
3. Nut

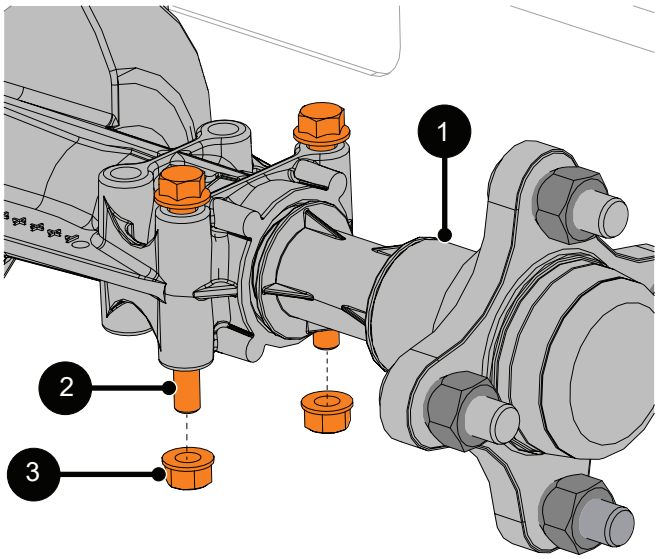
Figure 148

Rear Transmission Mount



1. Rear Transmission Support Bracket
2. Hex Bolt
3. Nut

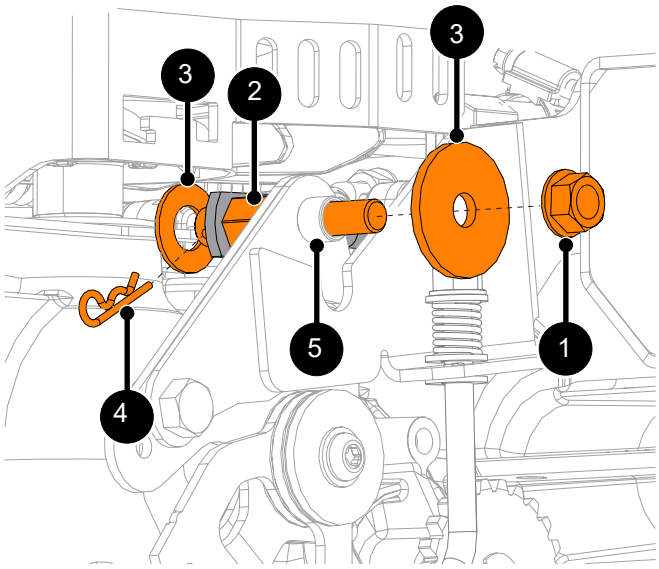
Figure 149



1. Transmission
2. Hex Bolt
3. Nut

Figure 150

2. Reinstall rod linkage head on drive control lever and secure with hardware removed earlier. See Figure 151.



1. Nut
2. Rod Linkage Head
3. Washer (2)
4. Hairpin
5. Rod Linkage Spacer

Figure 151

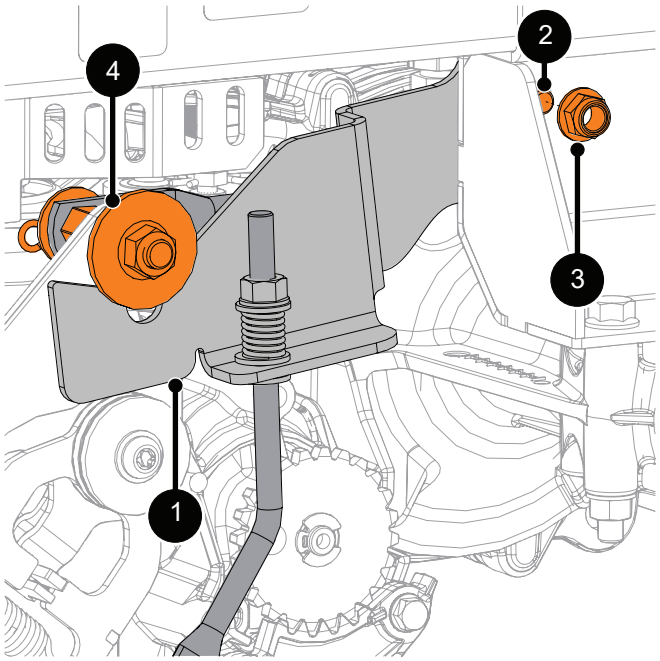
See Figure 152.

3. Reinstall brake latch bolt and nut. DO NOT tighten fully.

IMPORTANT: A slot in brake pivot plate allows it to rotate into correct position.

4. With hardware still loose, rotate brake pivot plate up so it engages rod linkage spacer (item 5 in Figure 151). When plate engages spacer, tighten brake nut (item 3 in Figure 152).

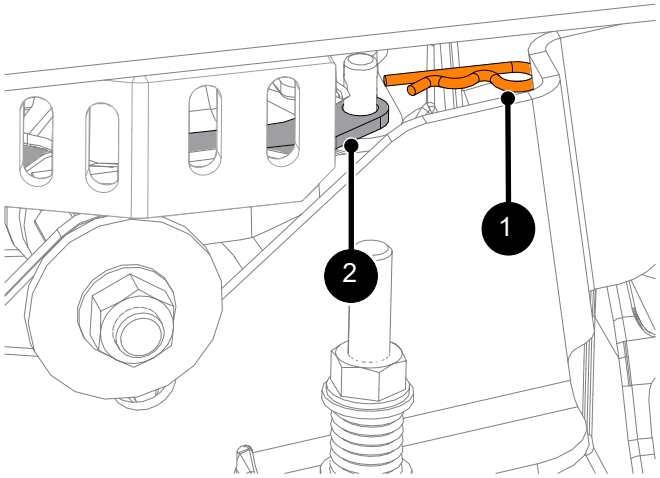
IMPORTANT: This will ensure brake latch is adjusted correctly and transaxle is in neutral position.



1. Brake Pivot Plate
2. Brake Latch Bolt
3. Brake Nut
4. Spacer (shown assembled)

Figure 152

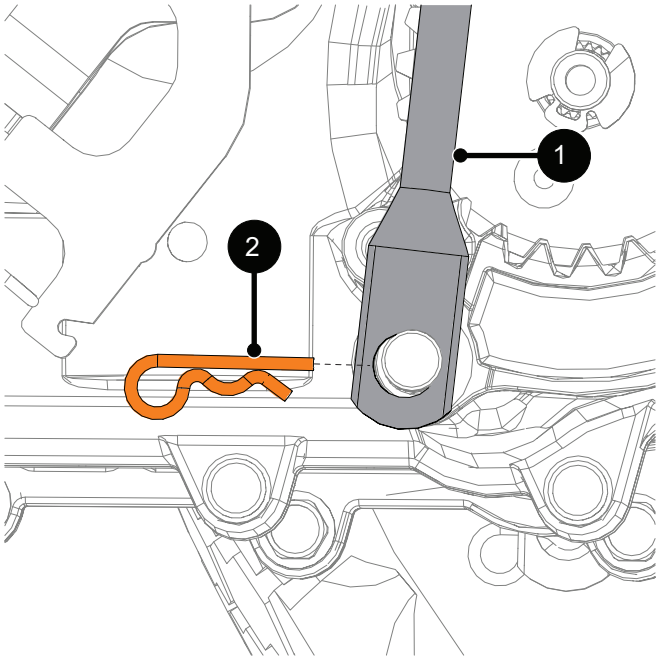
5. Reinstall control arm and secure with hairpin. See Figure 153.



1. Hairpin
2. Control Arm

Figure 153

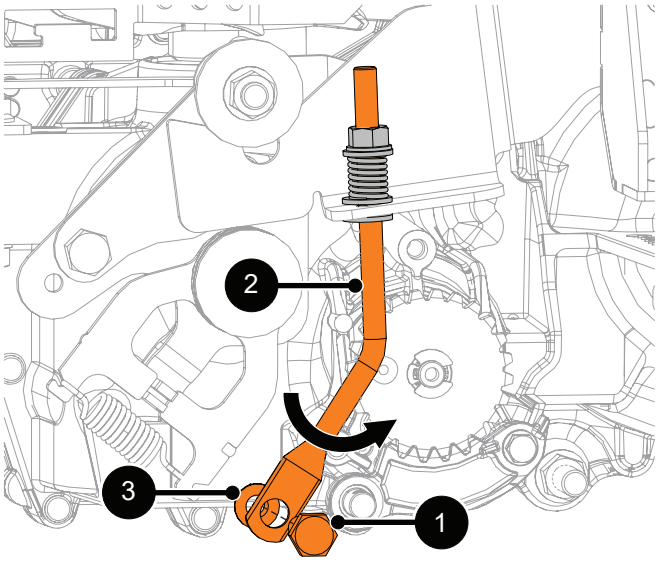
6. For X Models, reconnect parking brake rod and secure with hairpin. See Figure 154.



1. Hairpin
2. Parking Brake Rod

Figure 154

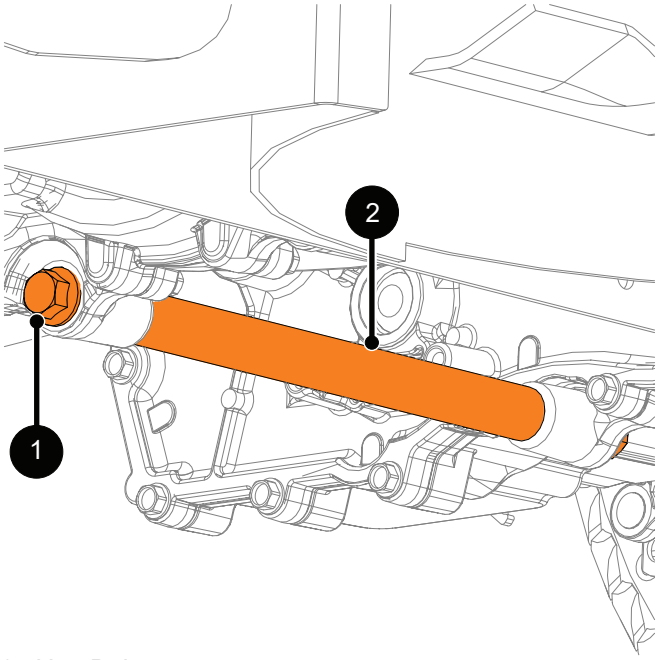
7. For XL Models, reconnect parking brake rod and secure with shoulder bolt and locking nut. See Figure 155.



1. Shoulder Bolt
2. Parking Brake Rod
3. Flange Top Locking Nut

Figure 155

8. Reposition connection rod and secure with hex bolt. See Figure 156.



1. Hex Bolt
2. Connection Rod

Figure 156

9. Reinstall ground drive belt onto pulley. See Figure 157.

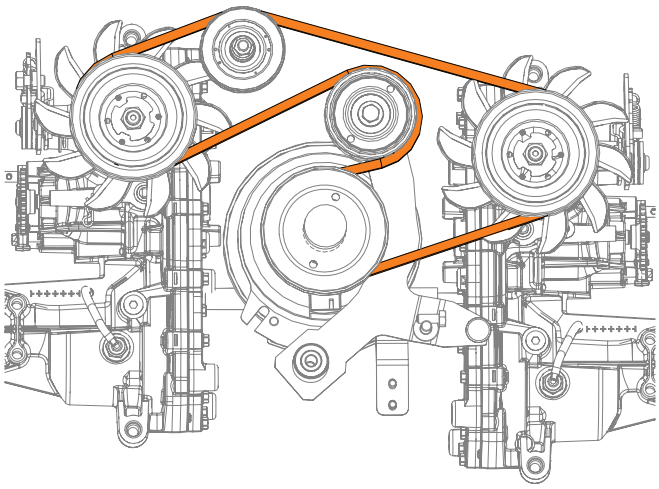
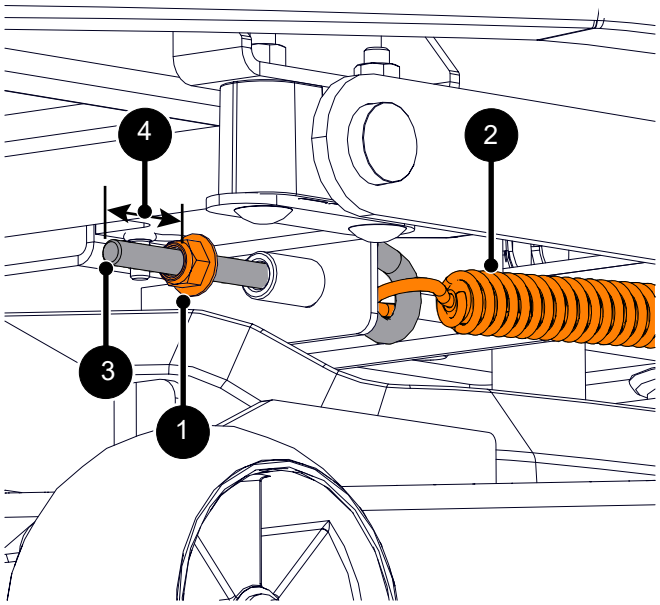


Figure 157

See Figure 158.

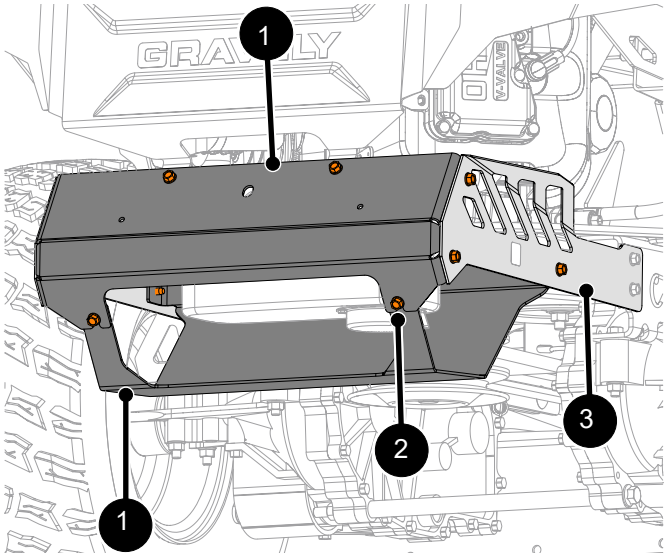
10. Reinstall idler spring and secure with nut loosened earlier.
11. Adjust tension of idler spring, returning threaded side of eye bolt to measured value taken during removal or 61 mm (2 13/32") to return ground drive belt tension on transmissions.



1. Nut
2. Idler Spring
3. Eye Bolt
4. Measured Value or 61 mm (2 13/32")

Figure 158

12. Reinstall the heat shield and secure with ten tapping screws. See Figure 159.



1. Heat Shield
2. Tapping Screws
3. Shield Arm

Figure 159

NOTICE: After replacing transmission, move control arm five to six times in both directions to bleed air from system.

13. Reinstall rear wheel. See *Rear Wheel Replacement* on page 45.
14. Return unit to operation position.
15. Purge hydraulic system. See *Purge Hydraulic System* on page 65.

Purge Hydraulic System

WARNING: AVOID INJURY. This adjustment requires operating engine. Use extreme care to avoid contact with moving parts and hot surfaces. Be sure rear of unit is well supported and secure before starting engine.

1. With unit up to and facing a wall, jack up unit so both drive wheels are off ground.
2. Disengage parking brake and put transaxle bypass levers in neutral position.
3. Start engine and slowly move steering levers forward and reverse five or six times.
4. Stop engine and put transaxle bypass levers in drive position.
5. Start engine and slowly move steering levers forward and reverse five or six times.
6. Stop engine. For XL Models, check oil level and add oil as needed.
7. Repeat steps 2 – 6 until transaxles operate smoothly forward and reverse at normal speeds without excessive noise.

NOTICE: When assembly is complete, check to ensure parking brake works properly. Also verify tracking and handle position.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

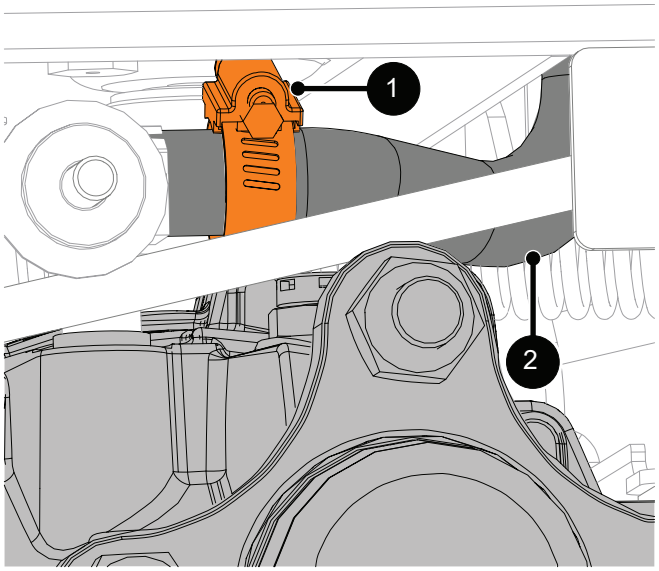
TRANSMISSION FAN AND PULLEY REPLACEMENT

Remove Fan and Pulley

IMPORTANT: Save all parts and hardware for reinstallation.

Drain transmission fluid. Complete steps 1-11 under*Hydraulic Transmission oil change - XL models only* on page 68.

1. Loosen hose clamp from top of transmission and remove hose from transmission. See Figure 160.



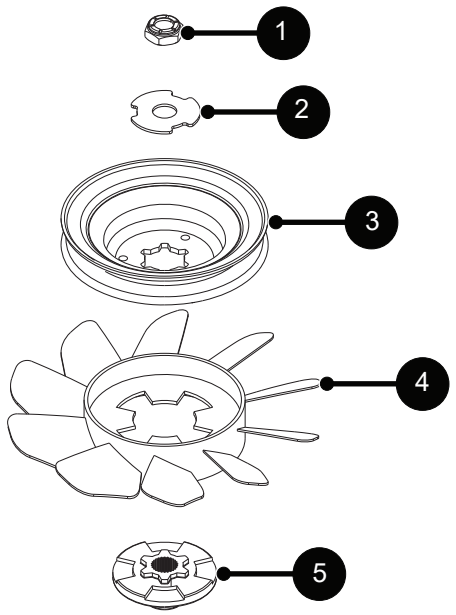
1. Hose Clamp
2. Hose

Figure 160

Remove transmission. See *Remove Transmission* on page 58.

See Figure 161.

2. Remove hex locking nut.
3. Remove slotted washer, pulley, fan and pulley disc.



1. Hex Locking Nut
2. Slotted Washer
3. Pulley
4. Fan
5. Pulley Disc

Figure 161

Install Fan and Pulley

See Figure 161.

1. Reinstall pulley disc, fan, pulley and slotted washer.
2. Secure with hex locking nut removed earlier. Torque nut to 61 N•m – 75 N•m (540 – 660 lb-in).
3. Install transmission. See *Install Transmission* on page 62.
4. Reinstall hose on transmission and tighten hose clamp.
5. Add Hydraulic Fluid. See *Add Hydraulic Fluid* on page 69.

HYDRAULIC EXPANSION TANK REPLACEMENT - XL MODELS ONLY

IMPORTANT: This procedure applies to either left or right side hydraulic expansion tank.

Remove Hydraulic Expansion Tank

IMPORTANT: Save all parts and hardware for reinstallation.

1. Place unit in service position. See *Service Position* on page 10.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

CAUTION: AVOID DAMAGE. DO NOT allow tools to contact metal surfaces when removing positive battery cable.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.

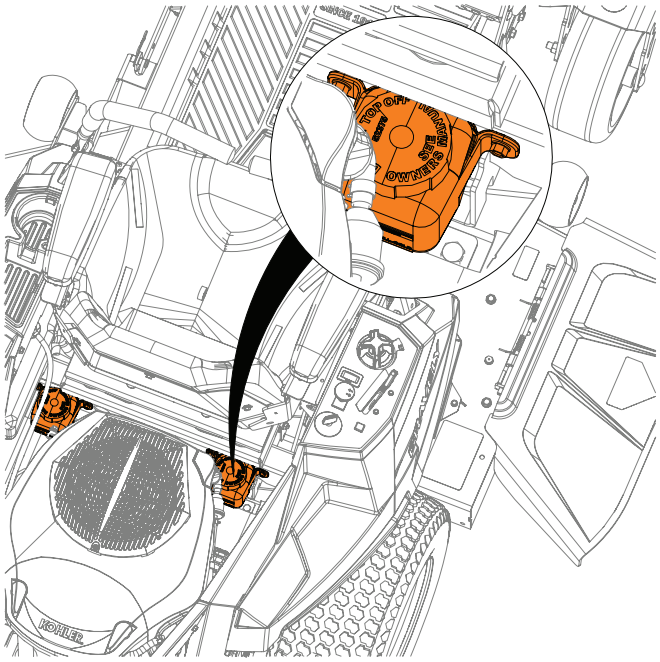


Figure 162

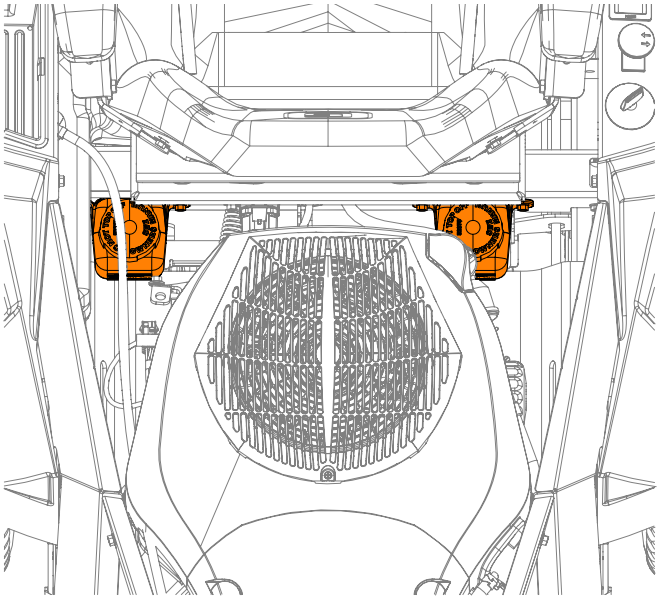
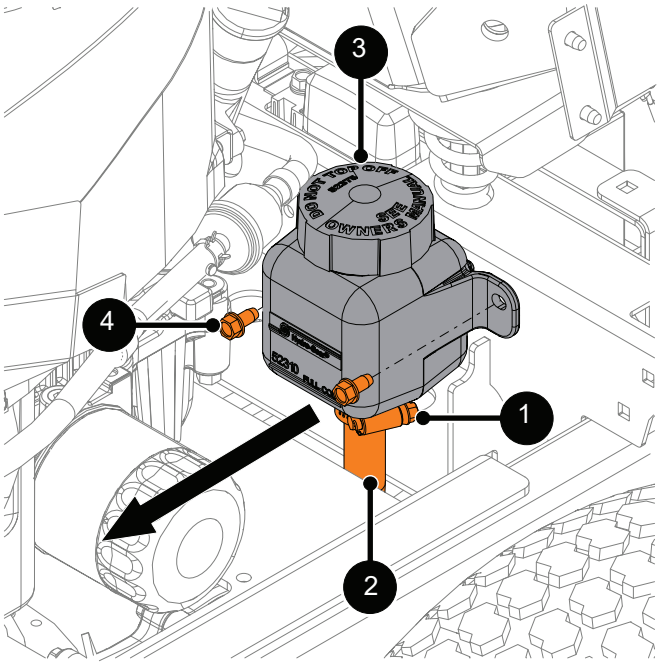


Figure 163

IMPORTANT: Position a suitable container under unit to catch any spilled fluid.

See Figure 164.

3. Remove hose clamp.
4. Disconnect hose from expansion tank.
5. Remove two tapping screws and expansion tank.

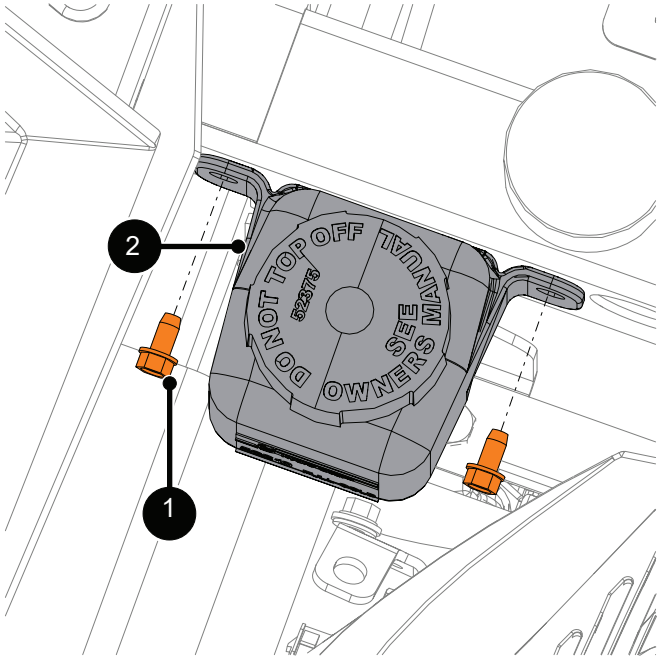


1. Hose Clamp
2. Hose
3. Hydraulic Expansion Tank
4. Tapping Screws (2)

Figure 164

Install Hydraulic Expansion Tank

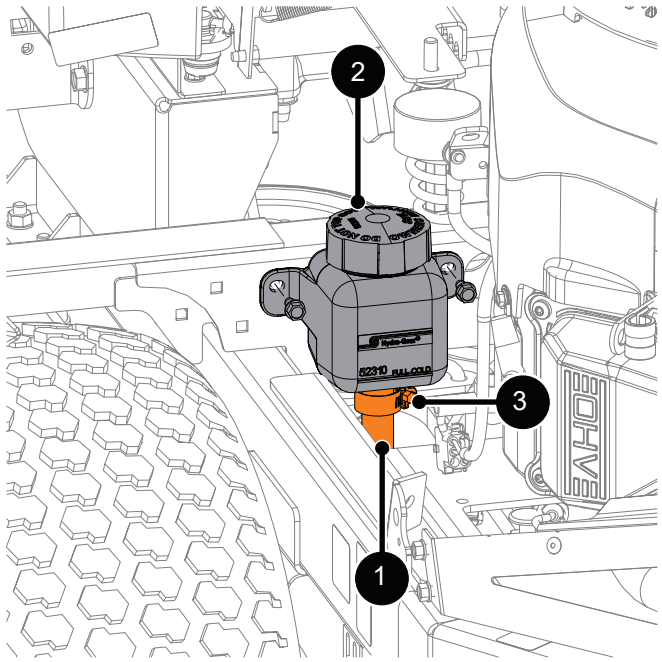
1. Reposition expansion tank and secure with two tapping screws. See Figure 165.



1. Tapping Screw
2. Hydraulic Expansion Tank

Figure 165

2. Reattach hose to expansion tank and tighten hose clamp. See Figure 166.



1. Hose
2. Hydraulic Expansion Tank
3. Hose Clamp

Figure 166

3. Check tank and hose, making sure there are no leaks.
4. Refill expansion tank with Gravely 15W50 part number 00057100 or equivalent engine oil, see *Hydraulic Transmission oil change - XL models only*, until level reaches cold fill indicator mark on tank.
5. Purge hydraulic system when replacement is complete. See *Purge Hydraulic System* on page 65.

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

6. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
7. Return unit to operating position.

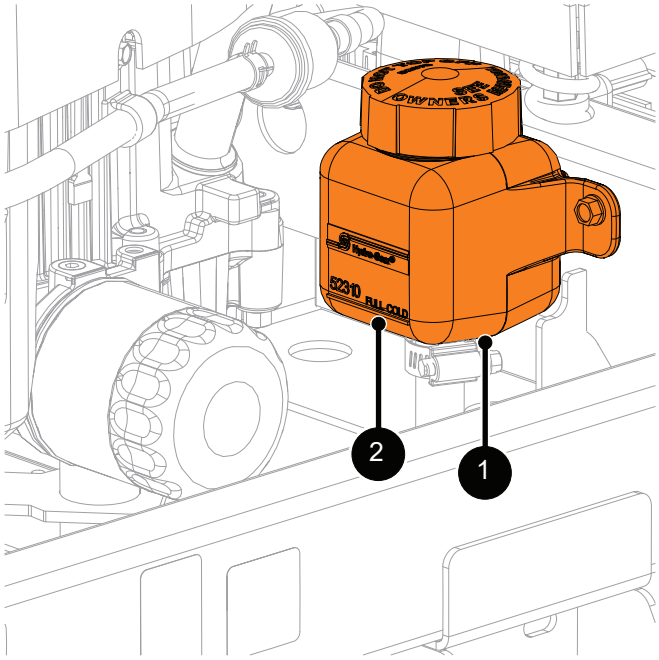
CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

HYDRAULIC TRANSMISSION OIL CHANGE - XL MODELS ONLY

IMPORTANT: Save all parts and hardware for reinstallation.

Use 15W-50 Synthetic Hydraulic Fluid, Gravely Part #00057100 (20W-50 engine oil may be substituted)

NOTICE: Change hydraulic fluid and filter after the first 75 hours of operation and then every 400 hours after.



1. Hydraulic Expansion Tank
2. Cold Fill Indicator Mark

Figure 167

1. Place unit in service position. See *Service Position* on page 10.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

CAUTION: AVOID DAMAGE. DO NOT allow tools to contact metal surfaces when removing positive battery cable.

2. Disconnect or remove battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Remove rear wheels. See *Remove Rear Wheel* on page 45.

IMPORTANT: Repeat this process on both sides of machine.

See Figure 167.

4. Loosen expansion tank cap.
5. Position a suitable container under filter to catch fluid.
6. Remove filter guard by removing three hex screws.
7. Remove and discard oil filter. Clean any loose debris from around the perimeter of the filter.
8. Loosen vent plug (located on inner surface of transaxle). DO NOT remove the plug.
9. Allow transaxles to drain completely (this could take up to 10 minutes).
10. Clean filter mounting surface and lubricate rubber gasket on new oil filter with clean hydraulic oil.
11. Spin new oil filter onto filter housing until it makes contact. Then, tighten oil filter another 3/4 turn.

NOTICE: Keep vent plug open until fluid reaches the vent plug. Close and tighten vent plug then continue to fill to expansion tank cold fill indicator mark.

Add Hydraulic Fluid

See Figure 167.

Fill reservoir with recommended fluid.

1. Remove cap from expansion tank.
2. Tighten vent plug to 20.3 N•m (15 lb-ft).
3. Fill expansion tank with recommended engine oil until level reaches vent plug on transmission. Close vent plug and continue to fill until fluid through expansion tank until full cold line is reached.
4. Replace expansion tank cap and hand tighten. DO NOT overtighten.
5. Reinstall oil filter guard and secure with hardware removed earlier, then torque to 7 N•m (65 lb-in).

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

6. Reinstall or reconnect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
7. Return unit to operating position.
8. Purge hydraulic system when replacement is complete. See *Purge Hydraulic System* on page 65.
9. Reinstall rear wheel. See *Rear Wheel Replacement* on page 45.

CAUTION: AVOID INJURY. Ensure all safety features work correctly before returning to service.

MOWER

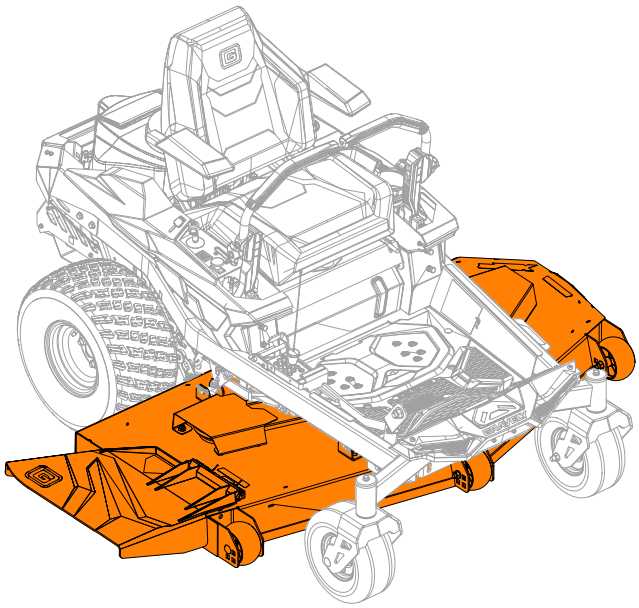


Figure 168

Correct alignment of cutting deck and blades is essential to achieve even mowing. See Figure 169. Check these conditions:

- Blades are an equal distance from ground.
- With blades oriented front to back, front tip of outer blades are 3.2 mm – 6.4 mm (1/8" – 1/4") lower than rear tip.

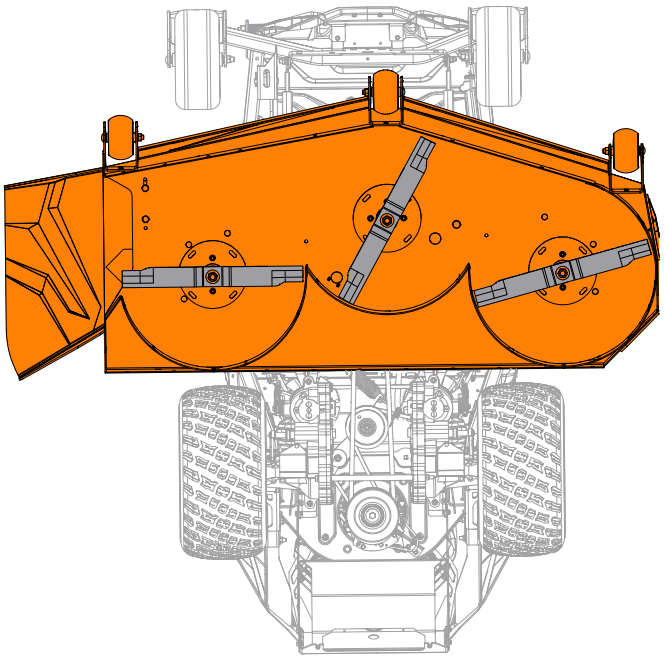


Figure 169

ADJUST MOWER DECK

Level Mower Deck

IMPORTANT: Save all parts and hardware for reinstallation.

WARNING: AVOID INJURY. Use sturdy gloves or padding to protect hands when working with mower blades.

Rotation of one blade rotates all blades.

IMPORTANT: Ensure unit is on flat, level surface.

1. Check tire pressures. See *Check Tire Pressure* on page 43.

See Figures 170 and 171.

2. Set deck to highest position.

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

3. Position mower blades so blade ends point LEFT to RIGHT across width of deck.
4. On each outer blade, use gauge to measure distance ground to tip on front outside edges ensuring that deck height is equal from left to right at front tip of blade.
   - If adjustments are needed, adjust nylon locking flange nut on deck-lift links. Tighten nut to raise deck. Loosen nut to lower deck.

IMPORTANT: It may be necessary to adjust nut on more than one deck link.

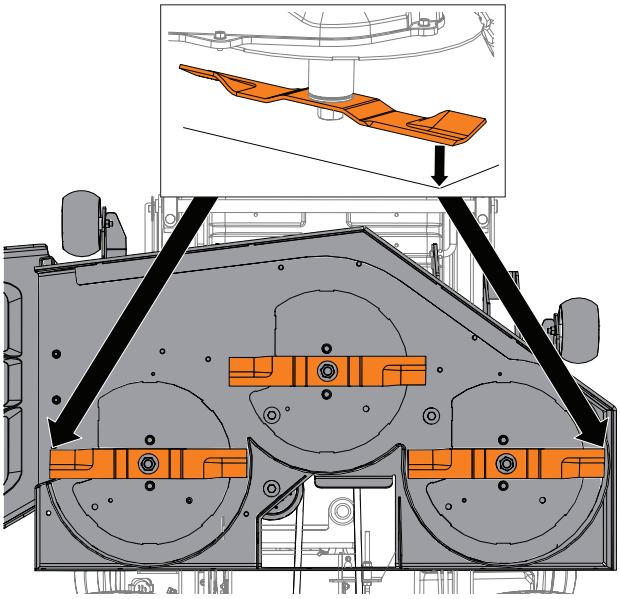
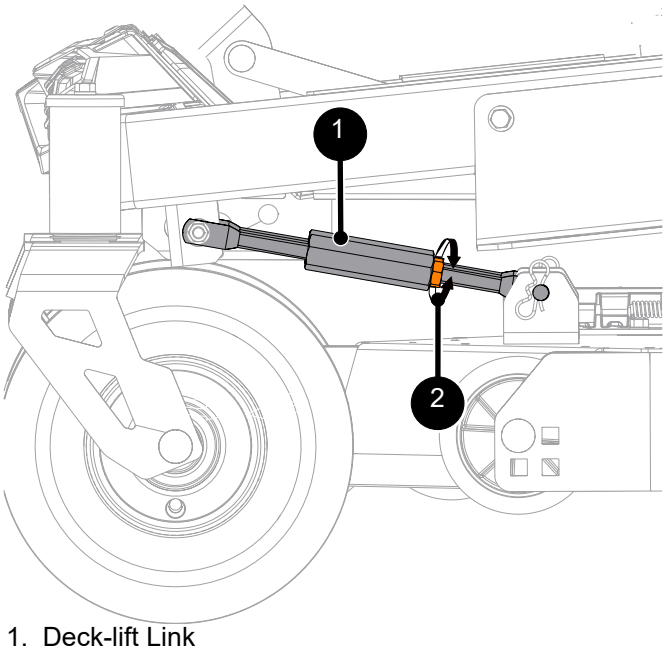


Figure 170



1. Deck-lift Link
2. Nylon Locking Flange Nut

Figure 171

5. If removed earlier, reinstall belt covers and secure with tapping screws.

IMPORTANT: Ensure belt has tension and remains aligned after installation is complete.

BLADE REPLACEMENT

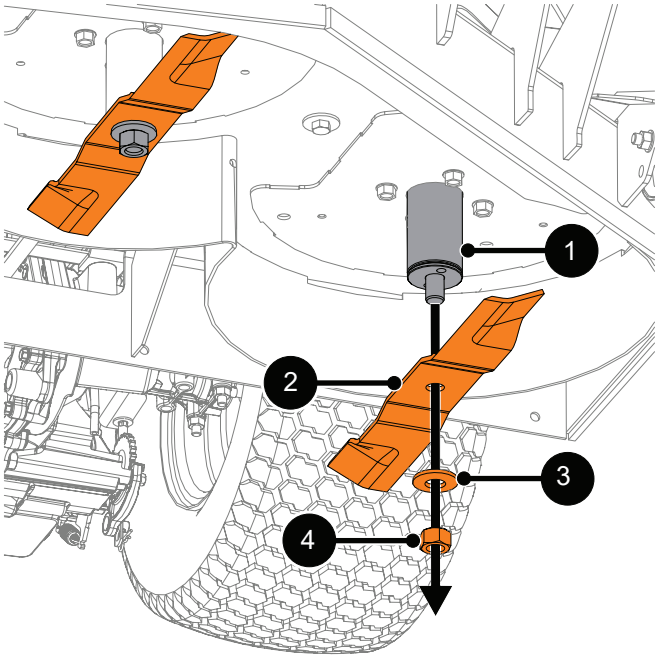
Remove Blade

IMPORTANT: Save all parts and hardware for reinstallation.

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

1. Remove nut, Belleville washer and blade. See Figure 172.

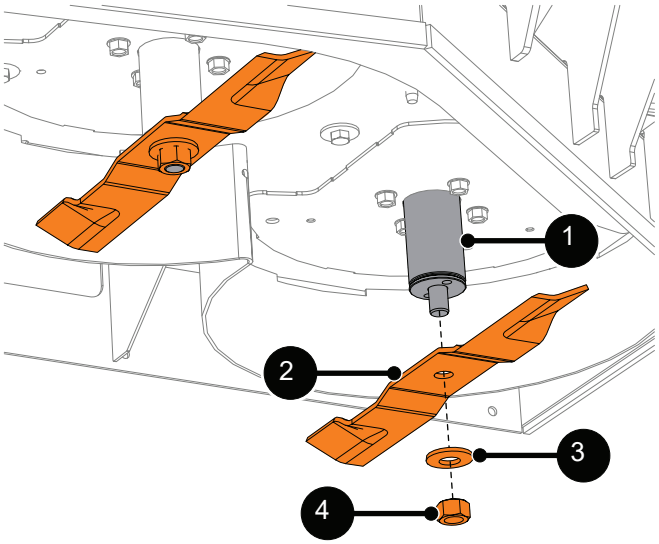


1. Spindle
2. Mower Blade
3. Belleville Washer
4. Nut

Figure 172

Install Blade

1. Reinstall blade, Bellville washer and nut on spindle. Ensure that cupped surface of washer faces blade.
   - Torque nut. DO NOT exceed 122 N•m (90 lb-ft). See Figure 173.



1. Spindle
2. Mower Blade
3. Belleville Washer
4. Nut

Figure 173

2. Properly adjust blade height. See *Adjust Blade Pitch* on page 71.

IMPORTANT: Check all adjustments after first use.

BLADE SERVICE

Adjust Blade Pitch

IMPORTANT: When measuring blade heights, use leveling gauge or appropriate measuring device. See Figure 174.

IMPORTANT: Save all parts and hardware for reinstallation.

Blade pitch is difference in blade height from front to rear.

1. Check tire pressures. Refer to Operator's Manual for specifications.

IMPORTANT: Level mower deck before setting blade height. See *Level Mower Deck* on page 70.

2. Set deck to highest position.

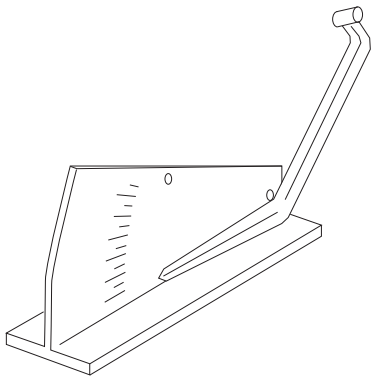


Figure 174

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

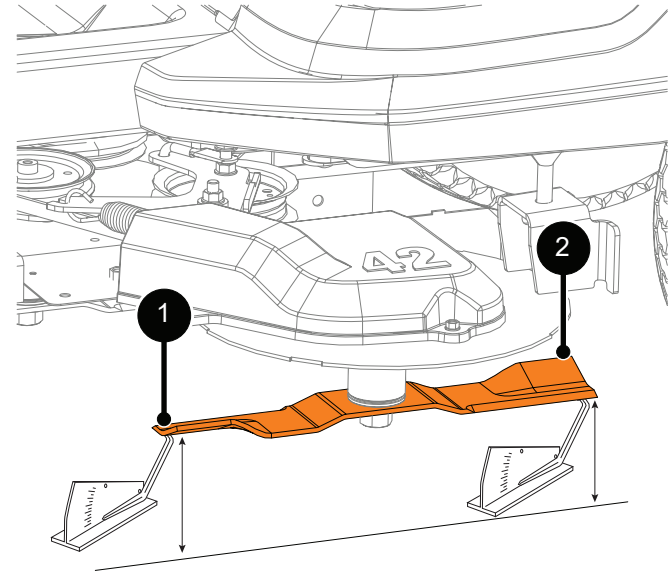
WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

3. Manually rotate mower blades into FRONT to BACK orientation. See Figure 169.

See Figures 175 and 176.

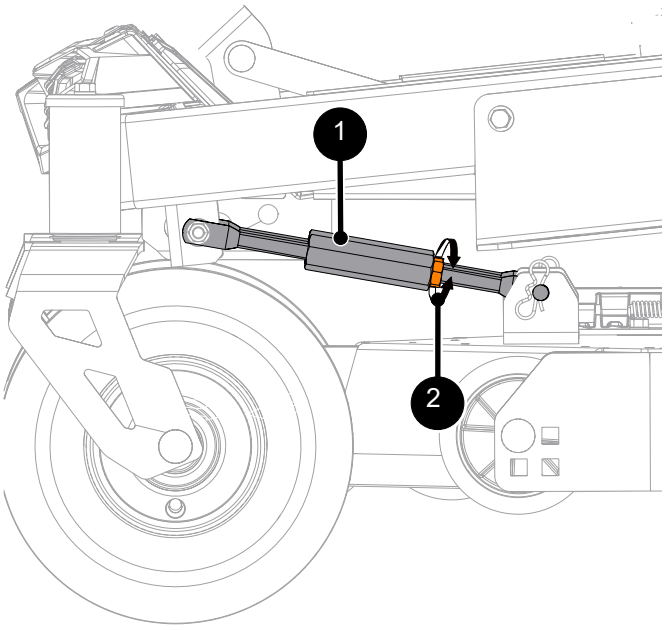
4. On each outer blade, use gauge to measure distance to ground at front and rear tip of blade.
   - If front tip of blade is ±6.35 mm (1/4") lower than rear tip, no adjustment is needed.
   - If adjustments are needed, adjust nylon locking flange nut on front and rear deck-lift links. Tighten nut to raise deck; loosen nut to lower deck.

IMPORTANT: Adjust one deck-lift link at a time until both ends of all blades reach desired measurements.



1. Front tip of blade - approx. 114 mm (4 1/2")
2. Rear tip of blade - approx. 120 mm (4 3/4")

Figure 175



1. Deck-lift Link
2. Nylon Locking Flange Nut

Figure 176

Check Blade Alignment

IMPORTANT: Save all parts and hardware for reinstallation.

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

1. Hold two blades firmly together and rotate blades to bring cutting edges closer.
2. Ensure height dimension between tips of blades does not exceed 4 mm – 5 mm (1/64" – 3/16"). Replace blades if out of tolerance. See Figure 177.

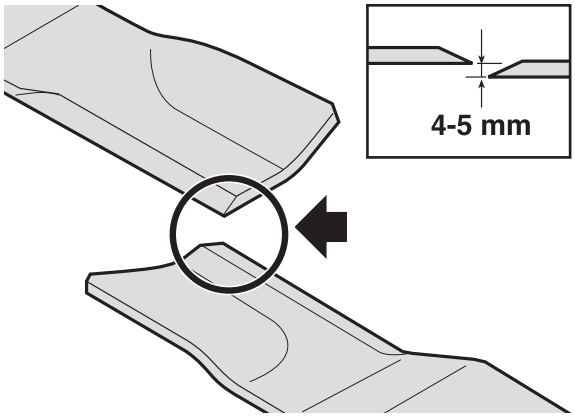


Figure 177

3. Repeat operation, checking cutting edges of blades in different combinations.

Check Blade Condition

IMPORTANT: Save all parts and hardware for reinstallation.

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

1. Remove blade for inspection. See *Remove Blade* on page 71.
2. Check blades for wear, breaks, bends or cracks. See Figure 178.

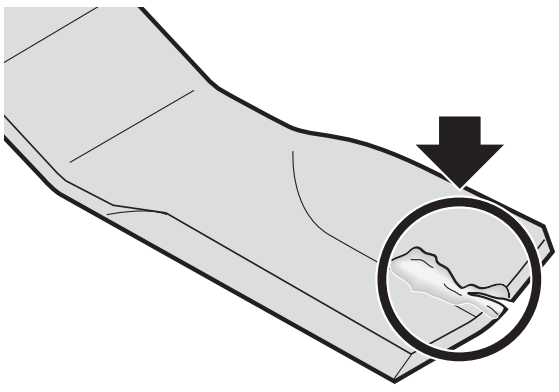


Figure 178

WARNING: Damaged blades must be replaced. Never repair or straighten.

Sharpen Blade

IMPORTANT: Save all parts and hardware for reinstallation.

A dull blade reduces grass cutting capability.

Always sharpen both cutting edges of blade.

Sharpen blade ONLY from side shown in illustration. Remove as little material as possible. See Figure 179.

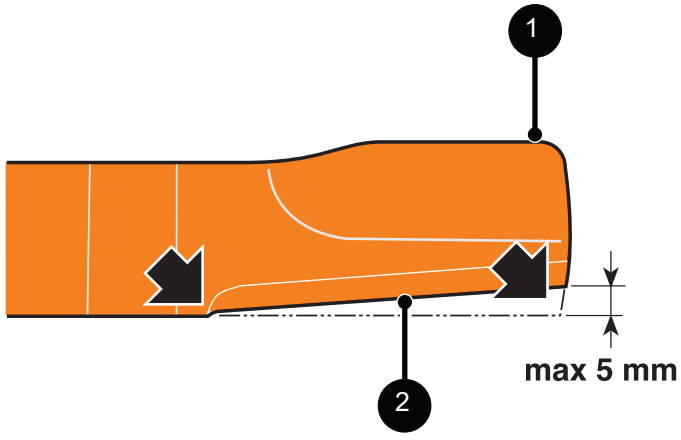
CAUTION: DO NOT sharpen blades while attached to unit.

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

1. Remove blade from unit. See *Remove Blade* on page 71.
2. Discard blade if:
   - More than 13 mm (1/2") of metal is removed
   - Air lifts are eroded
   - Blade is bent or broken
   - Cutting edge has worn down to 5 mm (3/16") or more
3. File or grind an equal amount of material from each cutting edge of blade until sharp. Ensure blades are balanced when sharpening procedure completed.

NOTICE: DO NOT change angle of cutting edge or round corner of blade.



1. Air Lift
2. Cutting Edge

Figure 179

Balance Blades

IMPORTANT: Save all parts and hardware for reinstallation.

NOTICE: Unbalanced blades cause excessive vibration and eventual damage to unit. Balance blades before reinstalling on unit. NEVER weld or straighten blades.

WARNING: AVOID INJURY. Always wear protective gloves when handling blades.

WARNING: AVOID INJURY. All three blades are connected to each other; rotation of any blade engages rotation of all blades.

IMPORTANT: A clean blade is critical to successful blade balancing.

1. Completely clean blade of debris and grass.

See Figure 180.

2. Attach MAG-1000 balancer (p/n 21573300) to sturdy vertical mounting surface in an area with no wind.
3. Push magnetic collar to back of balancer.
4. Put blade on balancer cone with blade's part number facing out.
5. While retaining blade, pull magnetic collar out until it grasps blade.
6. Gently release blade and allow it to come to rest with heavier side down.

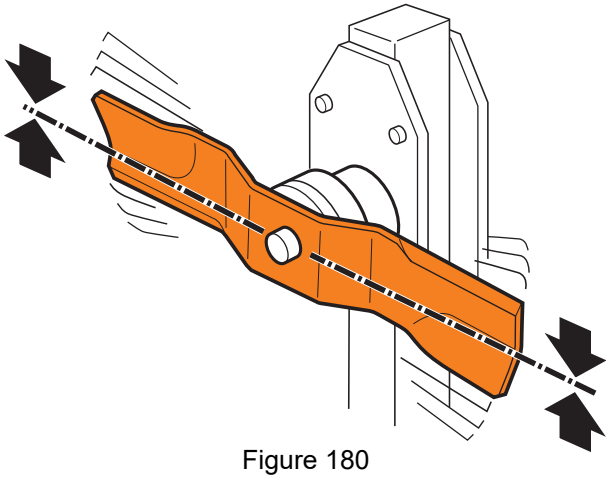
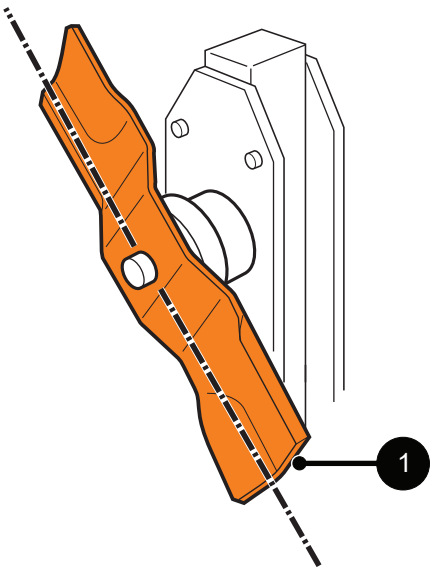


Figure 180

7. View blade's angle.
   - If blade is horizontal or within 45 degrees of horizontal, blade is within specification; no adjustment is needed.
   - If blade is more than 45 degrees from horizontal, sharpen blade to remove small amount of material unless blade is new. If blade is new, remove small amount of material from outside end of heavier side. Re-check balance and repeat removal of small amount until blade is within specification. See Figure 181.



1. Outside Edge of Heavier Side

Figure 181

DECK DRIVE BELT REPLACEMENT

Remove Deck Drive Belt

IMPORTANT: Save all parts and hardware for reinstallation.

WARNING: AVOID INJURY. Keep body parts away from idler when releasing idler spring tension.

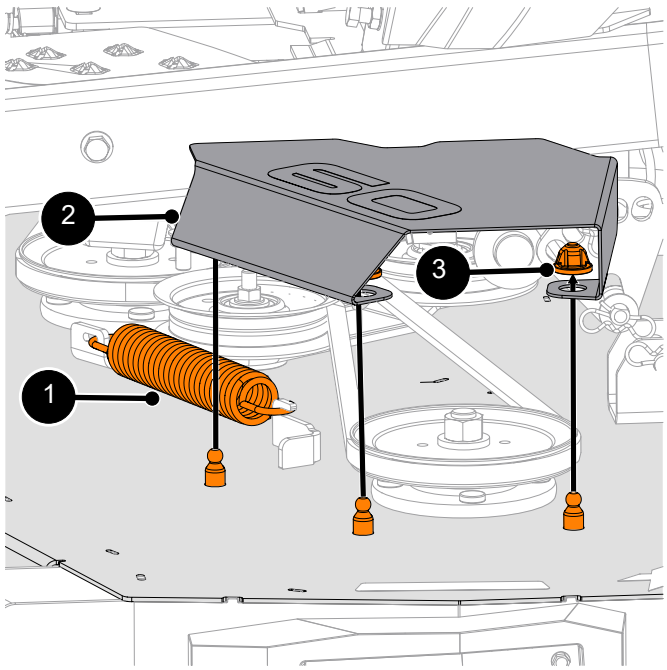
1. Park unit on level surface.
2. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
3. Set deck at lowest position.

See Figures 182.

4. Remove hardware securing belt cover to deck and remove belt covers.

NOTICE: Belt cover and position of securing screws varies per model and deck size.

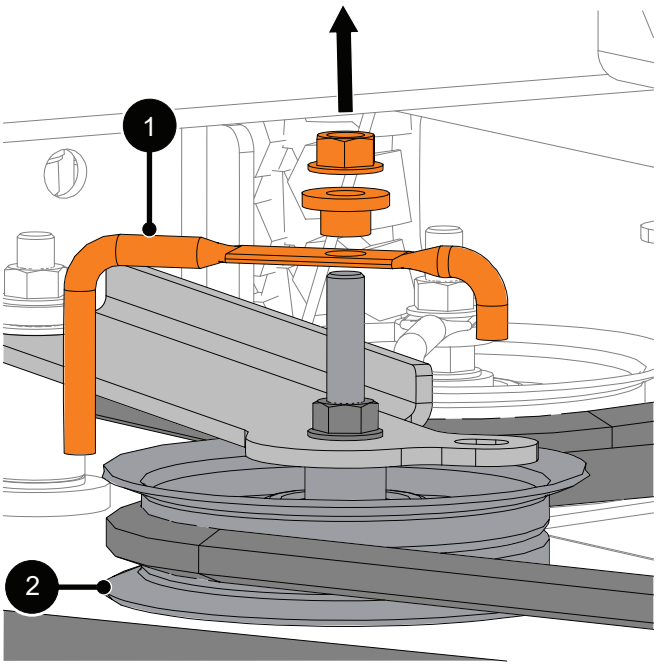
5. Make note of orientation of spring connections. Using a spring puller tool, remove spring.



1. Idler Spring
2. Belt Cover
3. Tapping Screws (3)

Figure 182

6. Remove belt fingers. See Figure 183.



1. Belt Finger
2. Idler Pulley

Figure 183

7. Remove deck drive belt.

Install Deck Drive Belt

1. Install deck drive belt. See Figure 184, 185, and 213.

IMPORTANT: Belt will not have tension until routed around clutch.

42" Decks

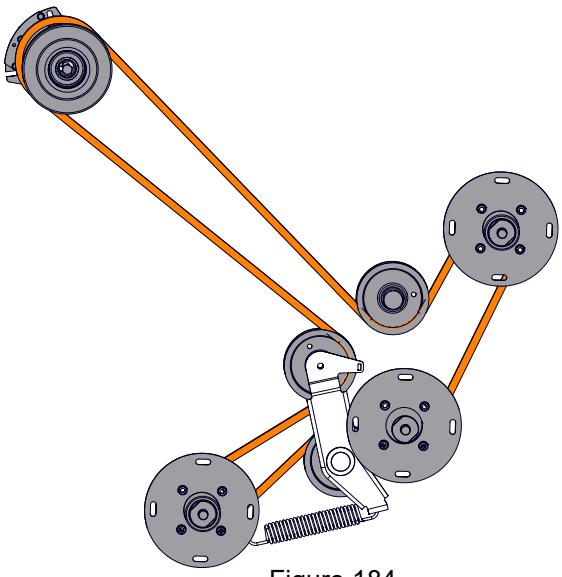


Figure 184

52" Decks

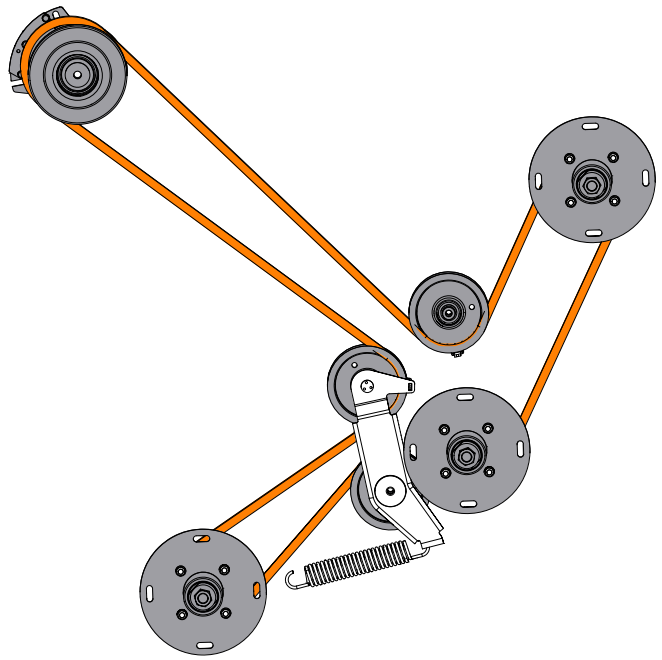


Figure 185

60" Decks

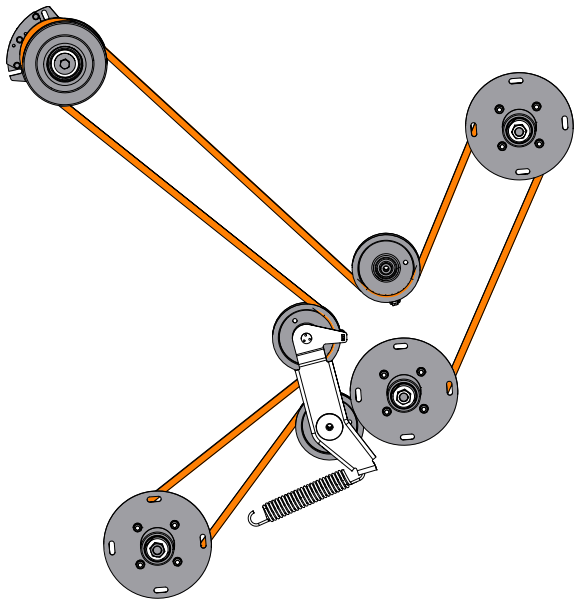
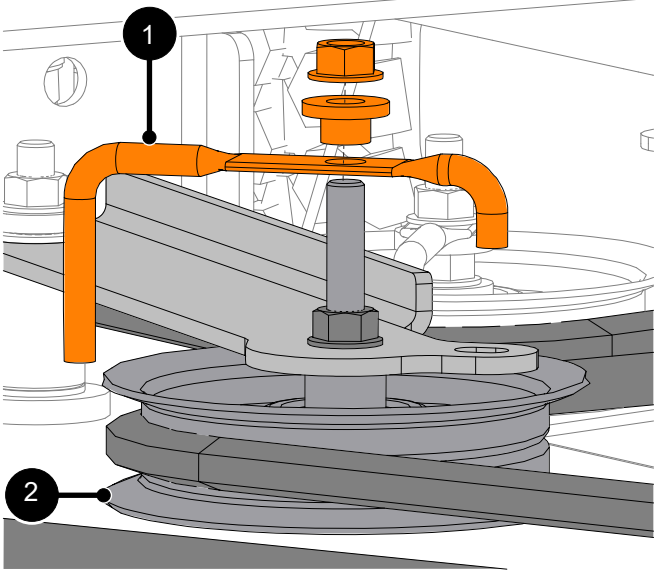


Figure 186

2. Reinstall belt fingers. See Figure 187.



1. Belt Finger
2. Idler Pulley

Figure 187

See Figure 188, 189 and 190.

3. Reconnect idler spring and install belt cover using hardware previously removed.

NOTICE: Belt cover and position of securing screws varies per model and deck size.

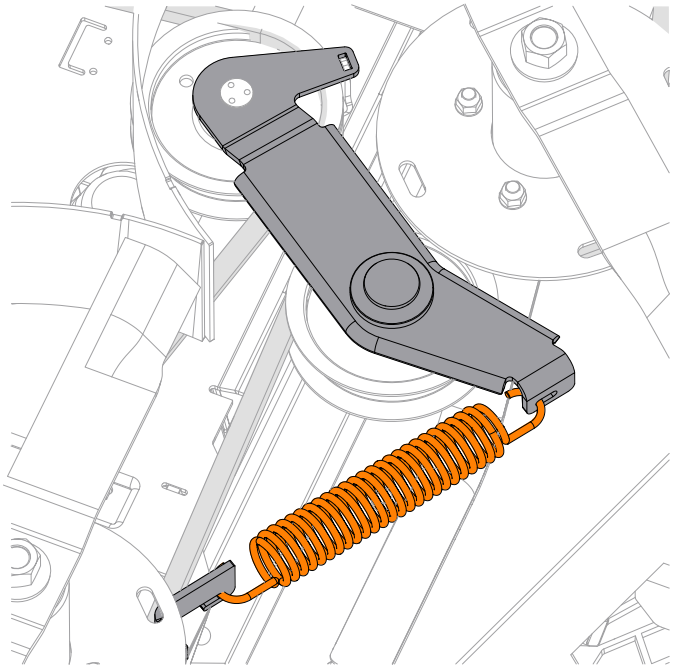


Figure 188

52" Decks

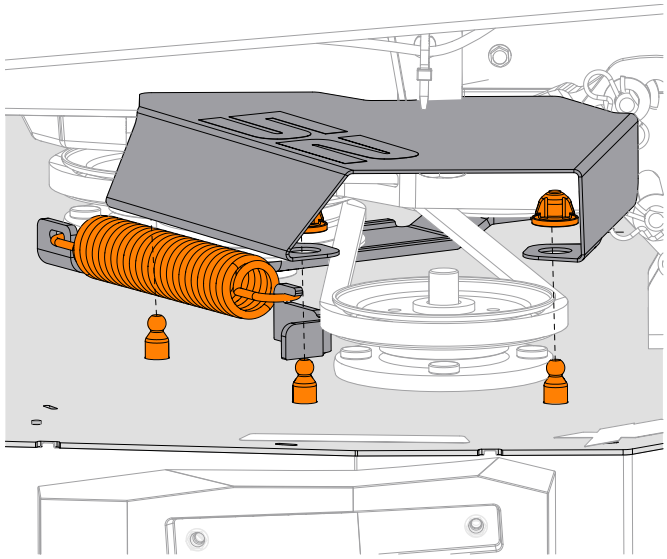


Figure 189

4. Reinstall belt covers and secure with tapping screws.

60" Decks

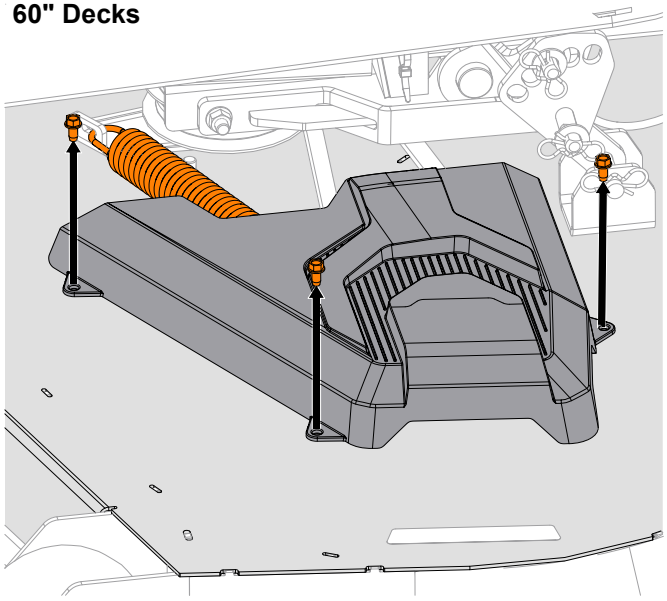


Figure 190

IMPORTANT: Ensure belt has tension and remains aligned after installation is complete.

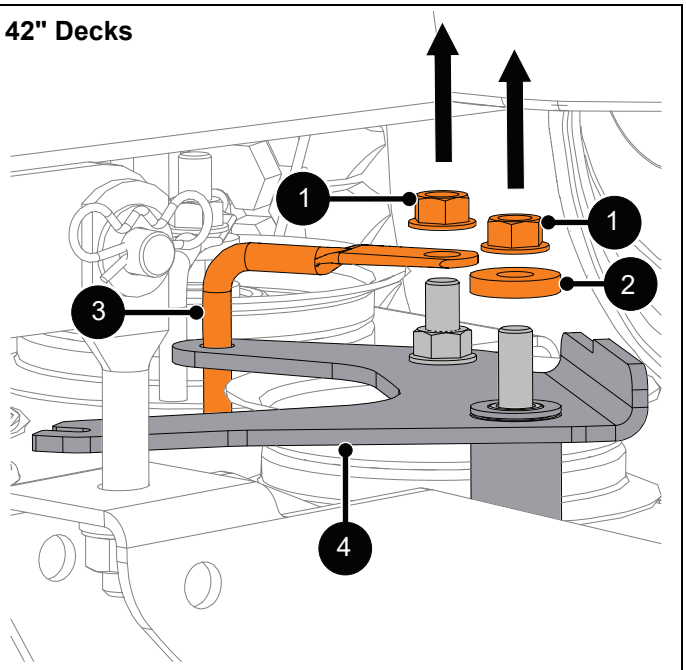
DECK DRIVE BELT IDLER ARM BEARING REPLACEMENT

IMPORTANT: Save all parts and hardware for reinstallation.

Remove tension from deck drive belt using steps 1 – 5 of *Deck Drive Belt Replacement* on page 75.

1. Remove belt finger on idler arm.
2. Remove nut and washer securing idler arm to deck. See Figures 191, 192 and 193 (belt removed for clarity).

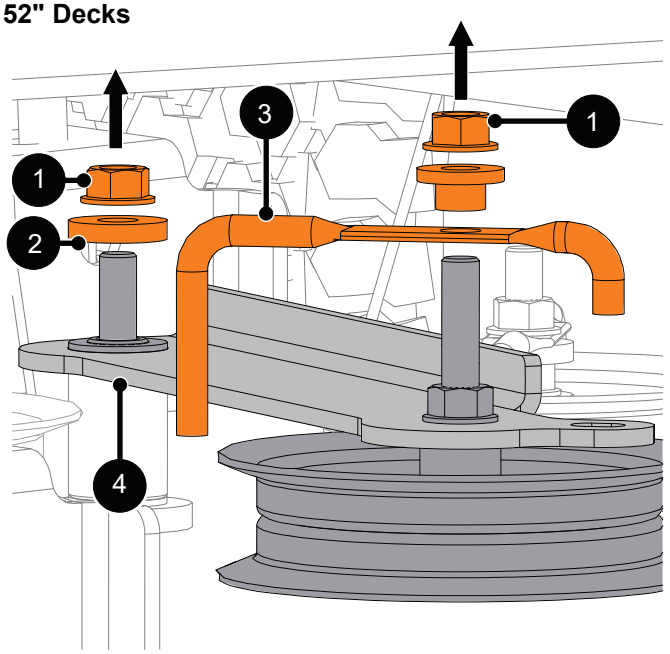
42" Decks



1. Nut
2. Washer
3. Belt Finger
4. Idler Arm

Figure 191

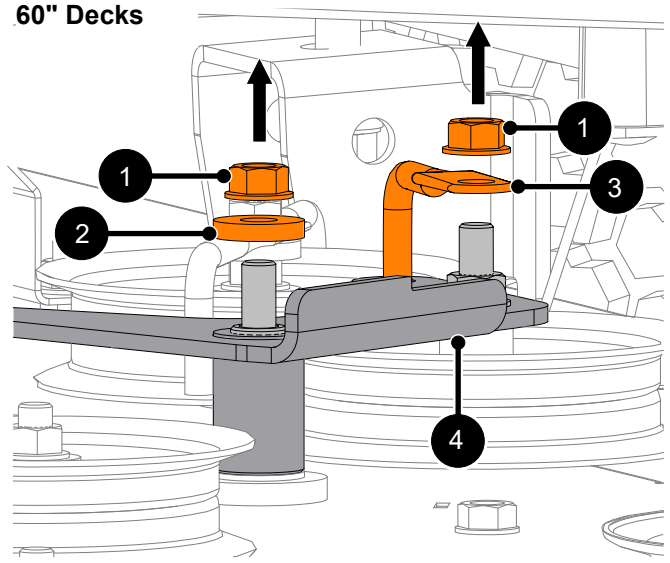
52" Decks



1. Nut
2. Washer
3. Belt Finger
4. Idler Arm

Figure 192

60" Decks



1. Nut
2. Washer
3. Belt Finger
4. Idler Arm

Figure 193

3. Remove idler arm, noting orientation of components. See Figures 194, 195 and 196.

42" Decks

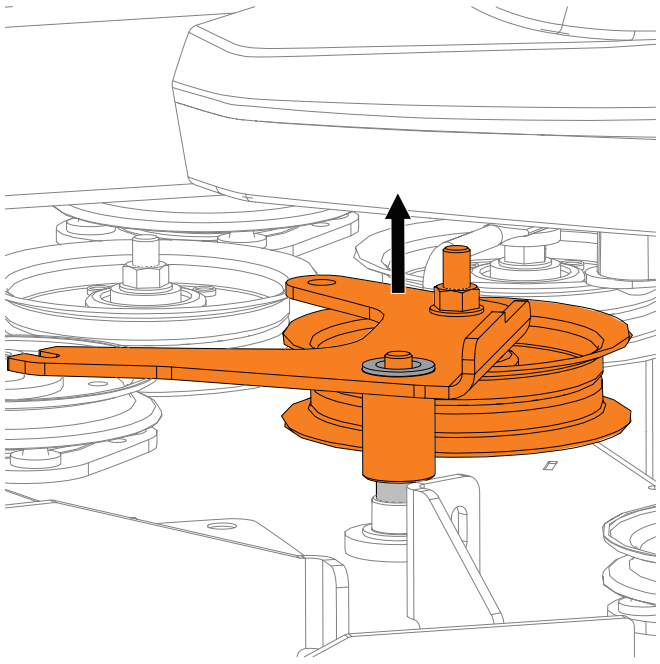


Figure 194

52" Decks

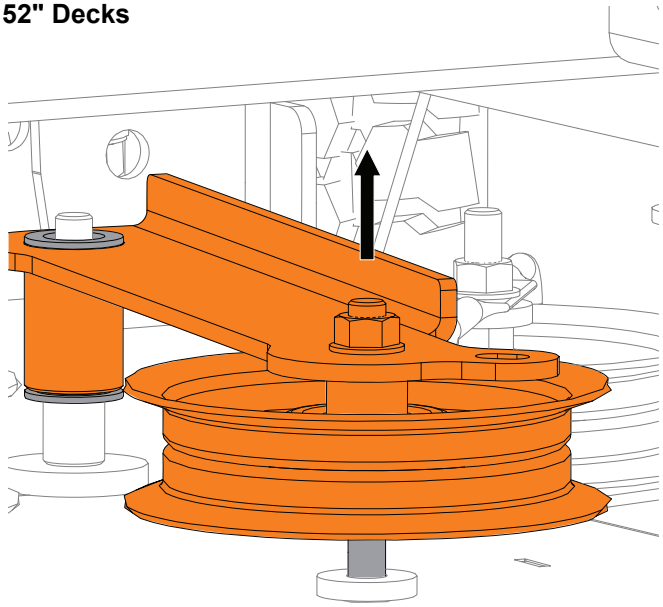


Figure 195

60" Decks

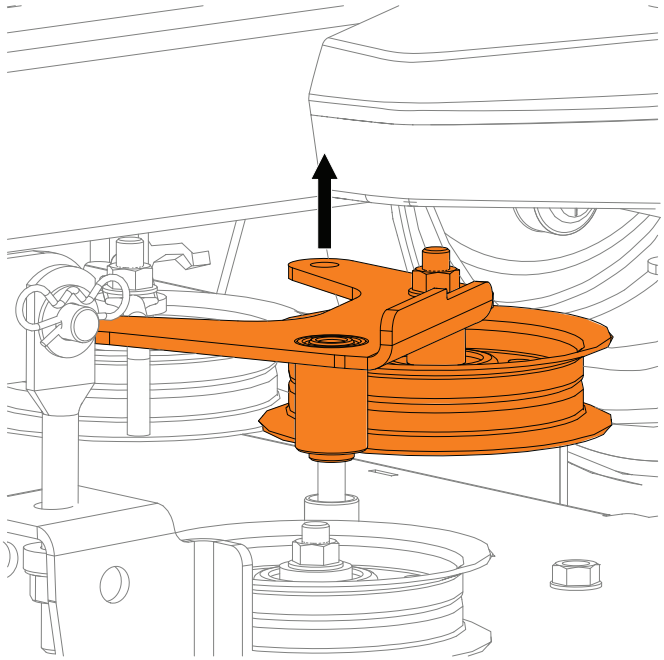
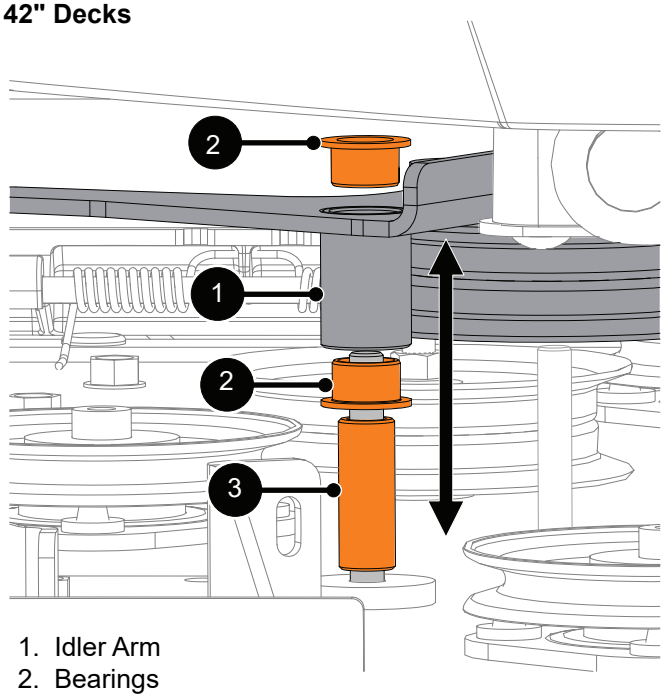


Figure 196

4. Inspect spacer and replace if required. Replace bearings. See Figures 197, 198 and 199.

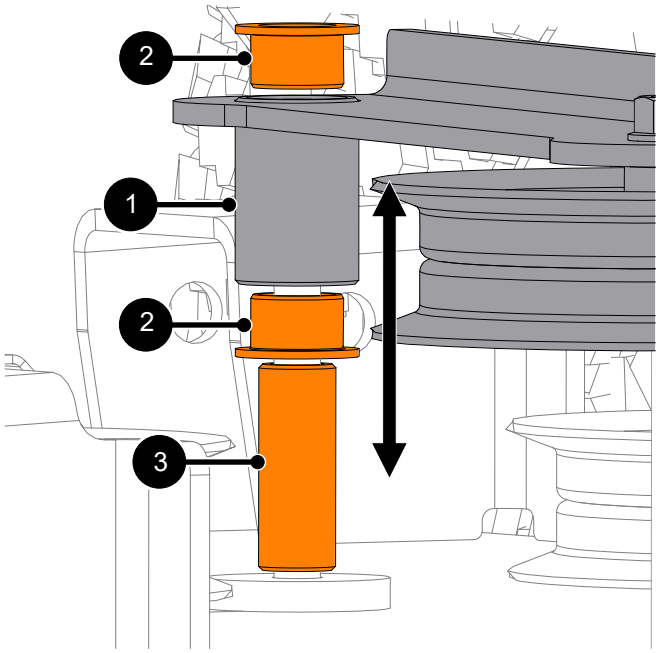
42" Decks



1. Idler Arm
2. Bearings
3. Spacer

Figure 197

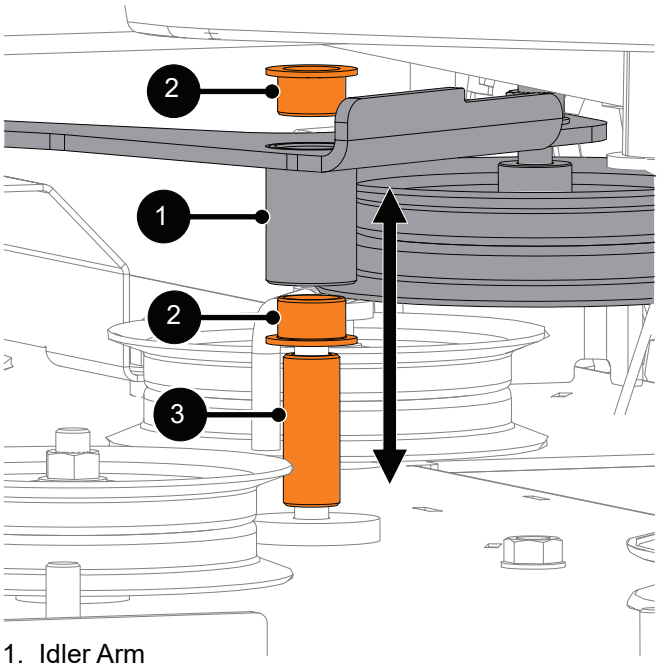
52" Decks



1. Idler Arm
2. Bearings
3. Spacer

Figure 198

60" Decks



1. Idler Arm
2. Bearings
3. Spacer

Figure 199

5. Reinstall idler arm and secure with hardware removed earlier. Tighten nut.
6. Check belt routing.
7. Reconnect idler arm spring.

8. Reinstall belt covers and secure with tapping screws.

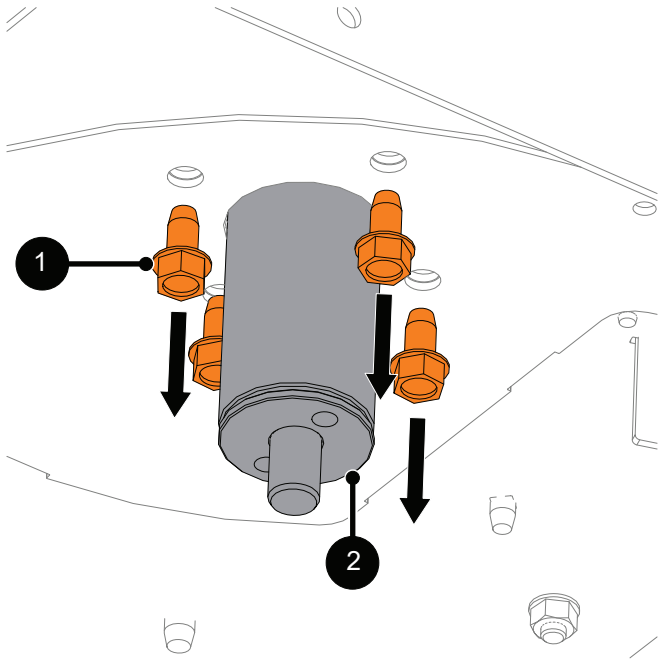
IMPORTANT: Ensure belt has tension and remains aligned after idler arm is reinstalled.

BLADE SPINDLE REPLACEMENT

Remove Blade Spindle

IMPORTANT: Save all parts and hardware for reinstallation.

1. Remove blade from spindle to be removed. See *Remove Blade* on page 71.
2. Remove deck drive belt. See *Remove Deck Drive Belt* on page 75.
3. Remove four flanged tapping screws from under deck, then lift spindle from upper deck to remove. See Figures 200 and 201.



1. Tapping Screws (under deck)
2. Spindle

Figure 200

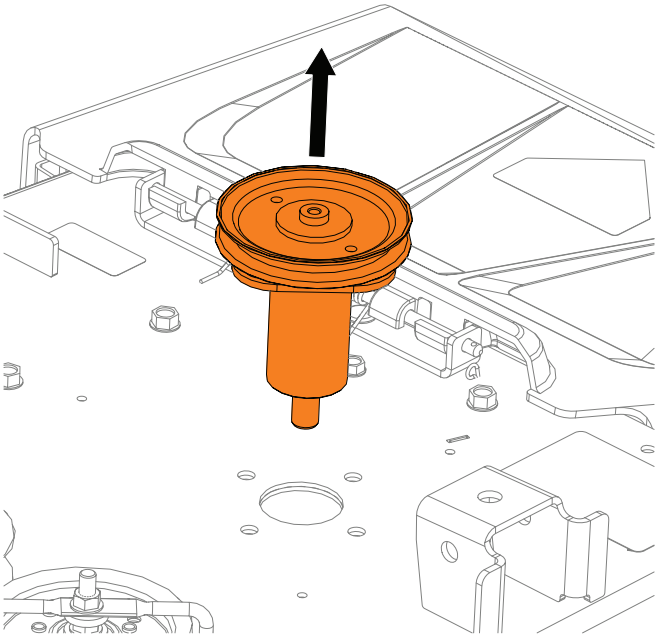


Figure 201

Install Blade Spindle

IMPORTANT: Spindles are available as single assembled units.

1. Reinstall spindle on upper deck and secure with four new tapping screws from below deck.
   - Torque tapping screws to 37 N•m – 43 N•m (330 lb-in – 380 lb-in). DO NOT overtighten.

See Figures 202 and 203.

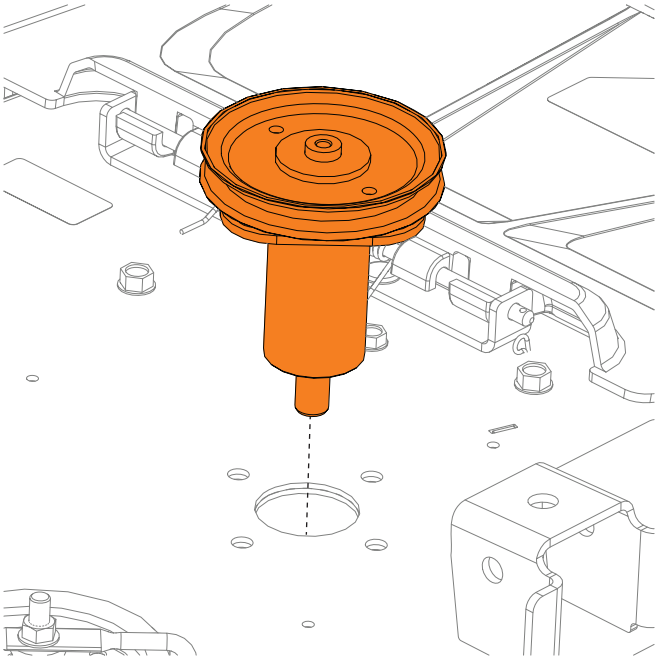


Figure 202

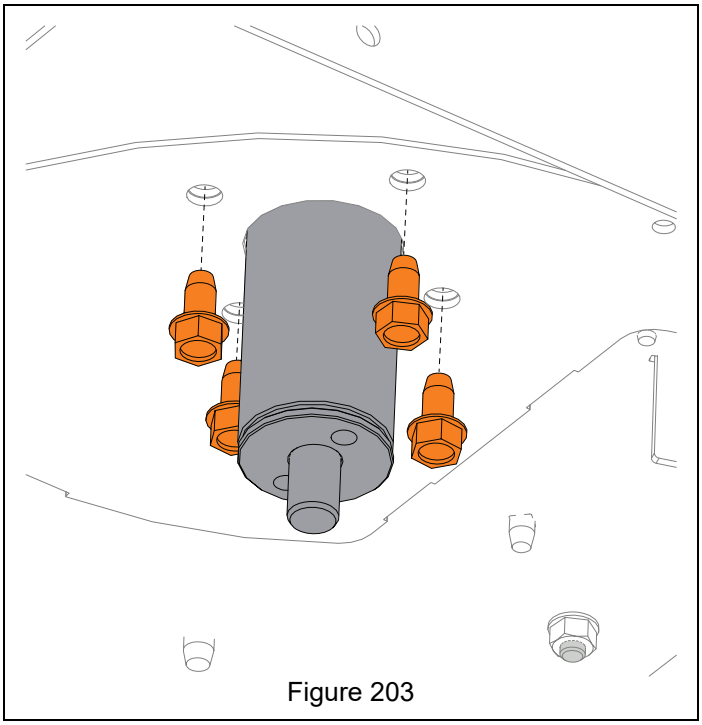


Figure 203

2. Reinstall blades. See *Install Blade* on page 71.
3. Reinstall deck drive belt. See *Install Deck Drive Belt* on page 75.

IMPORTANT: Check all adjustments after first use.

MOWER DECK

MOWER DECK REPLACEMENT

Remove Mower Deck

IMPORTANT: Save all parts and hardware for reinstallation.

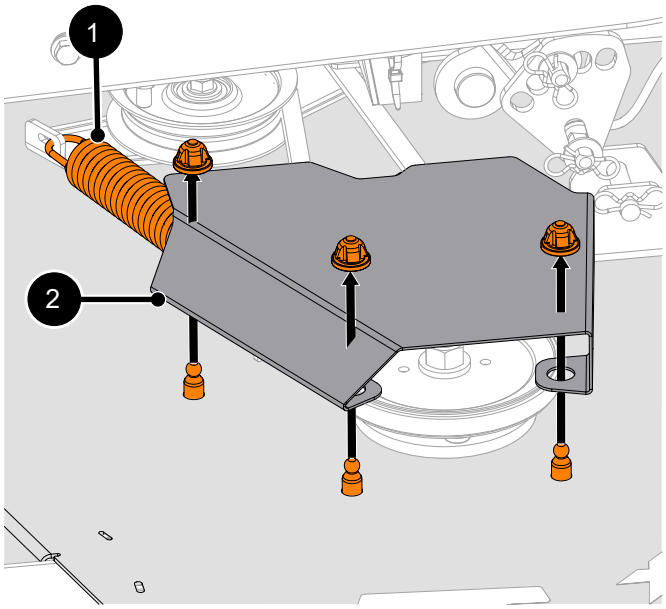
1. Park unit on level surface.
2. Allow engine and components to cool.
3. Set deck at lowest position.
4. Position supports, such as wood blocks, under mower deck.

See Figure 204.

5. Remove hardware securing belt covers to deck and remove belt covers.

NOTICE: Belt cover and position of securing screws varies per model and deck size.

6. Using spring puller tool, disconnect idler spring.



1. Idler Spring
2. Belt Cover

Figure 204

7. Remove deck drive belt from clutch. See *Remove Deck Drive Belt* on page 75 and Figure 205.

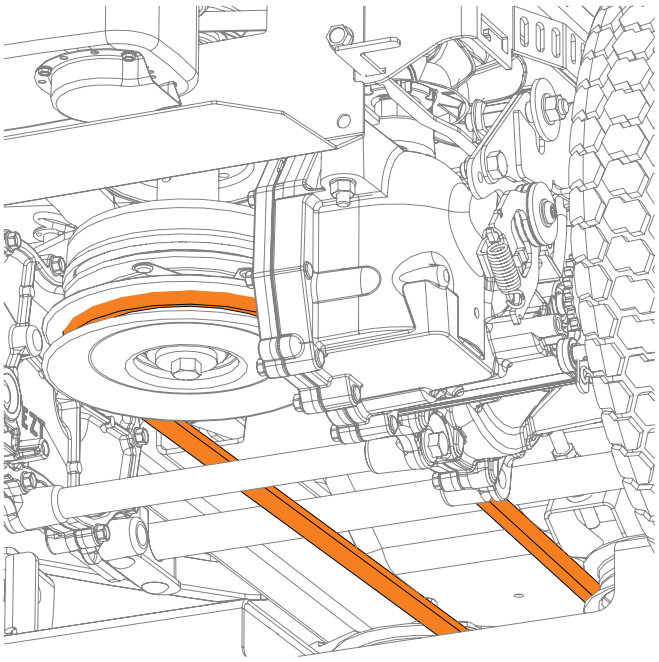
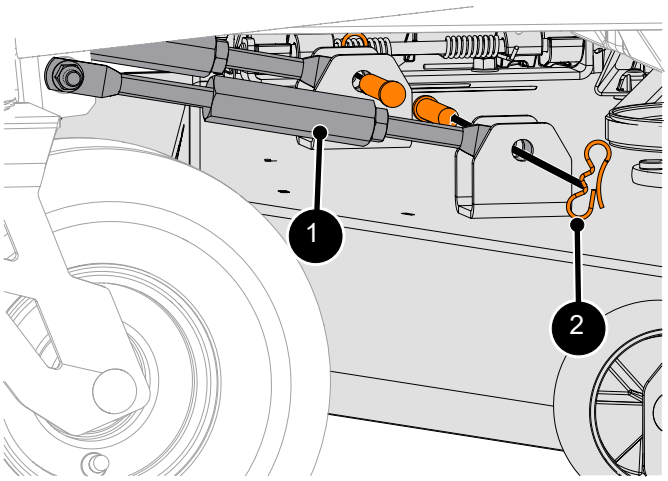


Figure 205

See Figure 206.

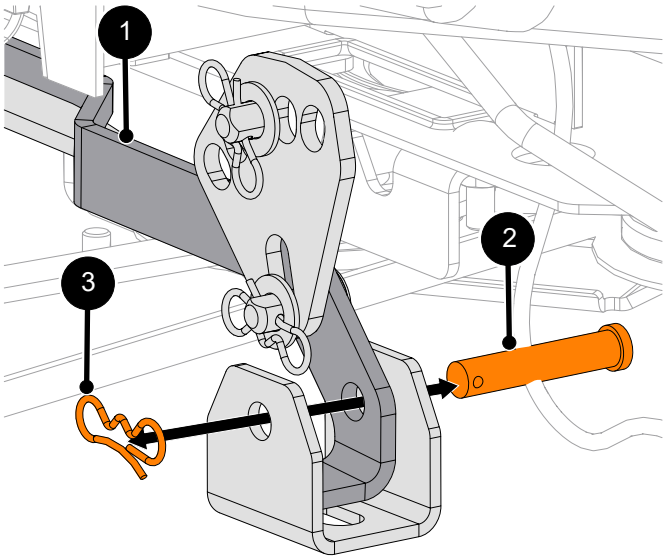
8. Remove one hairpin and one pin from right drag link to disconnect right drag link from mower deck bracket.
9. Repeat step 8 on left side.



1. Drag Link
2. Hairpin

Figure 206

10. Remove one hairpin and one pin from right deck lift lever. See Figure 207.



1. Deck Lift Lever
2. Deck Lift Pin
3. Hairpin

Figure 207

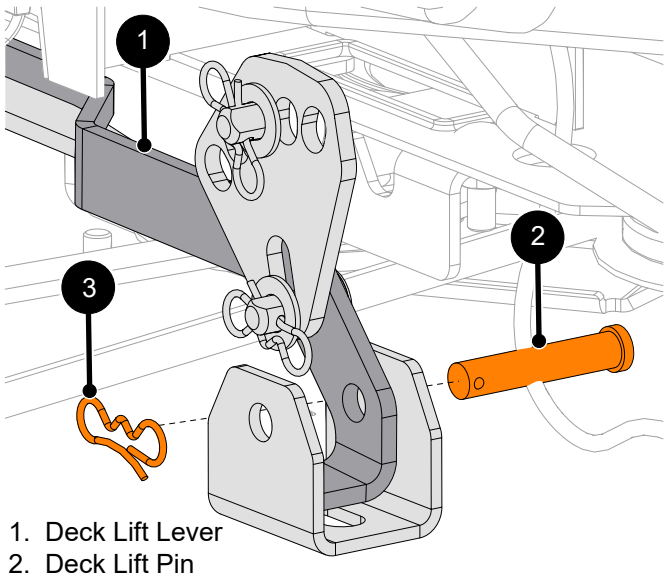
11. Repeat step 10 on left side.
12. Set height of cut at highest setting and carefully slide deck out from under mower frame taking caution to remain clear of any hanging linkages.

Install Mower Deck

1. Position deck under unit.

See Figure 158.

2. Secure right deck lift lever to deck link using original hardware.
3. Repeat step 2 on left side.

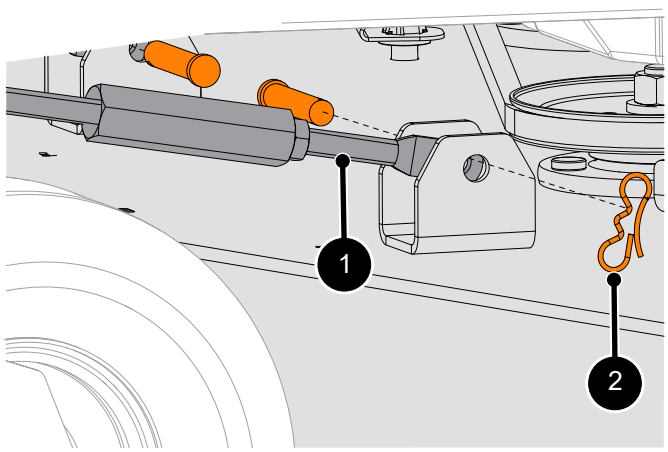


1. Deck Lift Lever
2. Deck Lift Pin
3. Hairpin

Figure 208

See Figure 209.

4. Secure right drag link through mower deck bracket using hairpin removed previously.
5. Repeat step 4 on left side.



1. Drag Link
2. Hairpin

Figure 209

6. Route deck drive belt around clutch deck and spindle pulleys. See *Install Deck Drive Belt* on page 75.
7. Using a spring puller tool, reconnect idler spring.
8. Reinstall belt covers and secure with tapping screws.
9. Check deck level. See *Level Mower Deck* on page 70.

IMPORTANT: Check all adjustments after first use.

HEIGHT OF CUT SYSTEM REPLACEMENT

Remove Height of Cut System

IMPORTANT: Set deck to lowest cutting position. Remove or block up deck and allow foot pedal to come backwards to alleviate load on height of cut selector lever.

IMPORTANT: Save all parts and hardware for reinstallation.

1. Depress notch and slide self locking pin from Height of Cut (HOC) lock bracket. See Figure 210.

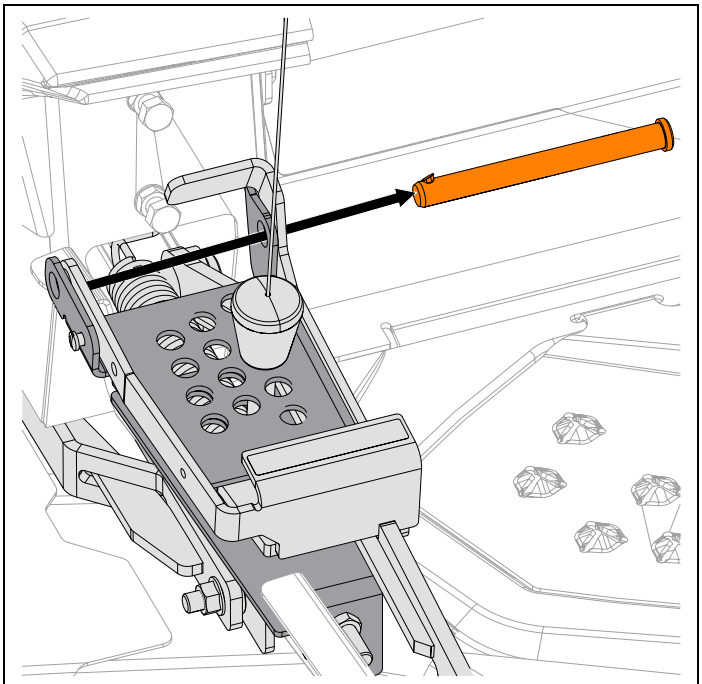
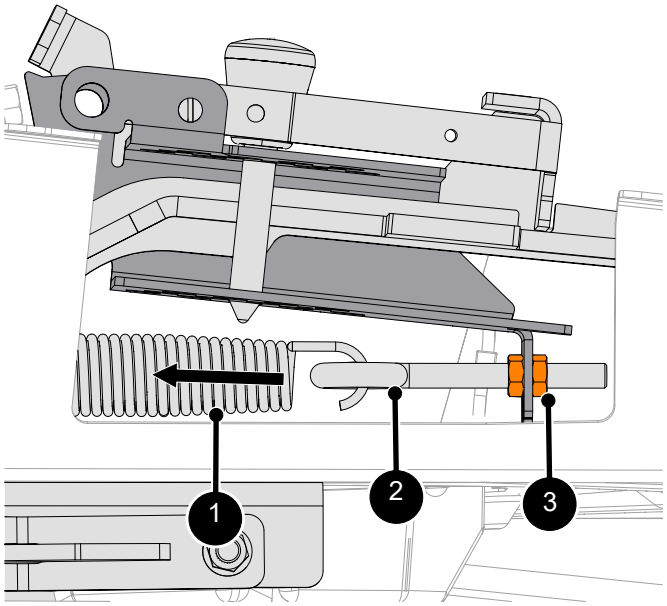


Figure 210

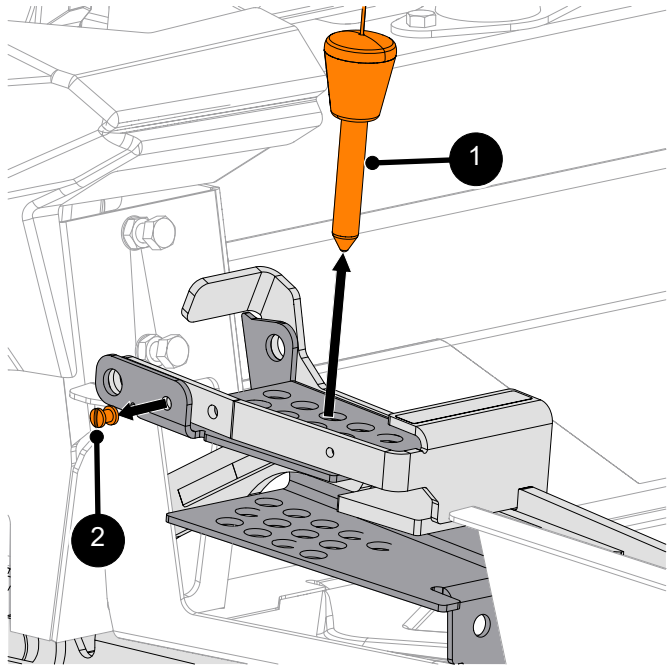
2. Loosen front nut on spring anchor bolt to loosen spring enough to remove it. Remove and retain jam nuts, anchor bolt and adjustment spring. See Figure 211.



1. Adjustment Spring
2. Anchor Bolt
3. Jam Nuts

Figure 211

3. Remove HOC magnetic pin and one push lock screw securing HOC guide plate to transport lock brace. See Figure 212.



1. Magnetic HOC Pin
2. Push lock screw

Figure 212

See Figure 213.

4. Remove HOC guide plate from bracket and deck lift / transport lock assembly.

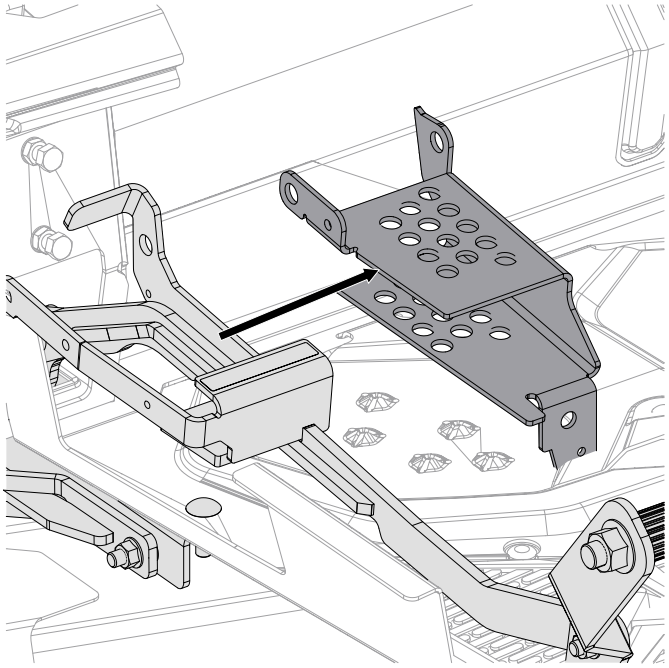


Figure 213

Install Height of Cut System

1. Reassemble Height of Cut (HOC) guide plate with deck lift / transport lock assembly. See Figure 214.

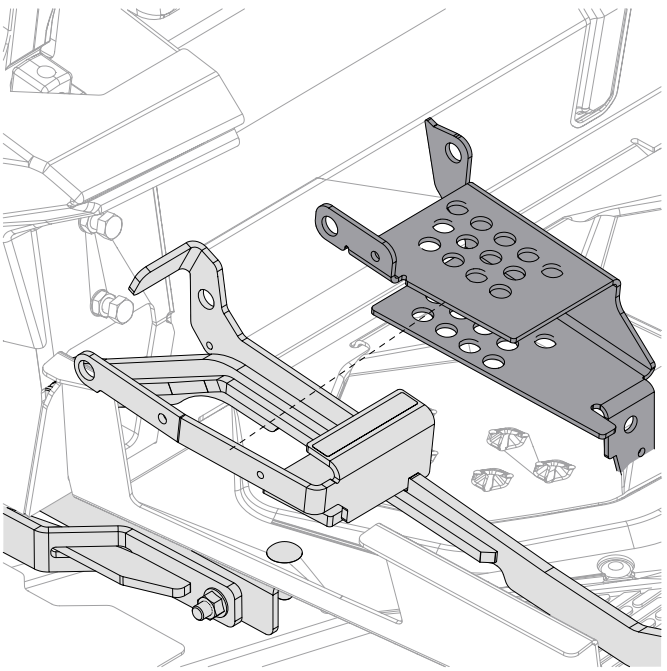
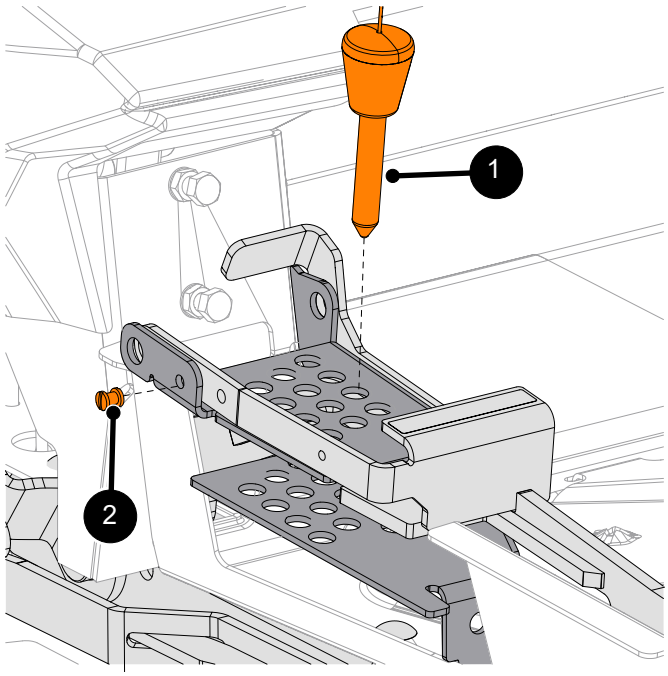


Figure 214

See Figure 215.

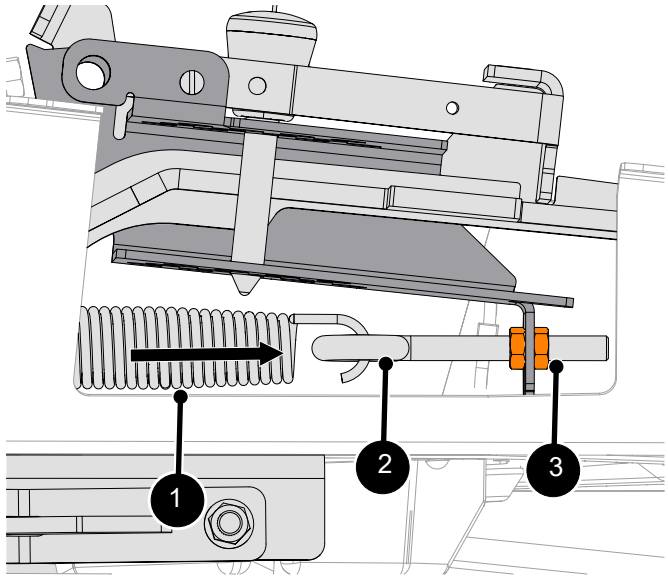
2. Place magnetic HOC pin in HOC guide plate.
3. Secure guide plate to transport lock bracket with one push lock screw removed previously.



1. Magnetic HOC Pin
2. Push lock screw

Figure 215

4. Reattach adjustment spring to eye bolt and deck lift link. Tighten to secure by threading two jam bolts removed previously on either side of the HOC guide plate. See Figure 216.



1. Adjustment Spring
2. Eye Bolt
3. Jam Nuts

Figure 216

5. Slide self locking pin into HOC assembly until pin is fully inserted and secure.

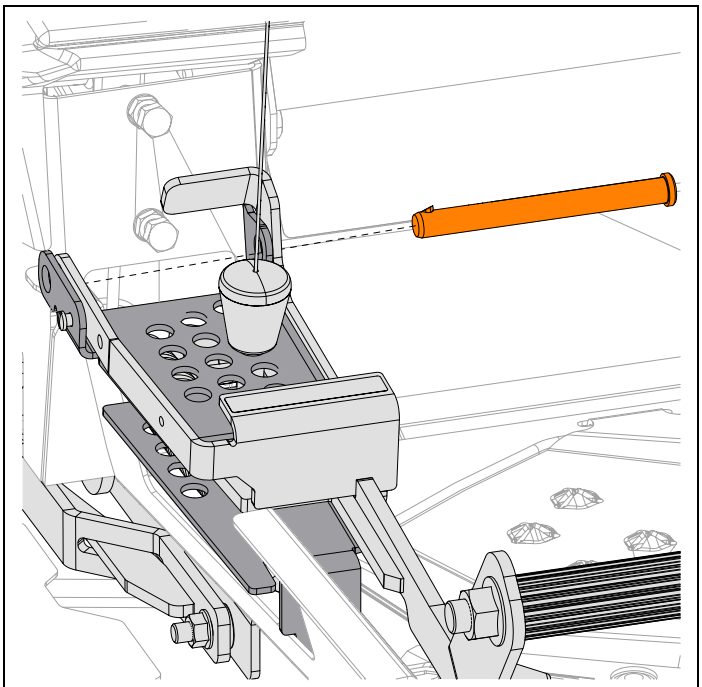


Figure 217

6. Ensure all safety devices work properly.

ANTI-SCALP WHEEL REPLACEMENT

Remove Anti-Scalp Wheel

IMPORTANT: Save all parts and hardware for reinstallation.

WARNING: AVOID INJURY. Wait for all moving parts to stop before leaving operator's position.

See Figure 218.

1. Remove nut and shoulder bolt from anti-scalp wheel.
2. Remove anti-scalp wheel.

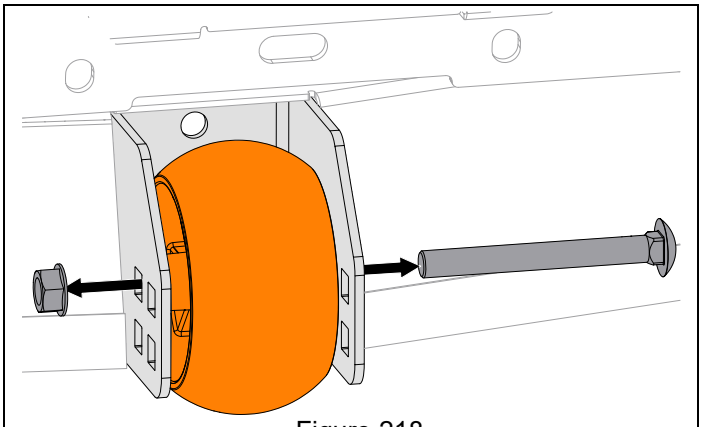


Figure 218

Install Anti-Scalp Wheel

See Figure 218.

1. Reinstall anti-scalp wheel and secure with shoulder bolt and nut.
2. Ensure anti-scalp wheel rotates freely after installation.

ELECTRICAL

ELECTRICAL MEASUREMENTS

Voltage Measurement

- A voltmeter measures voltage difference between test leads.
- When measuring voltage, components must remain connected to wire harness in order to detect any resistance in a circuit.
- Disconnected component(s) simulates an open/cut wire and will provide false voltage readings.

Current Measurement

- An ammeter measures current that flows through a meter by connecting it into a circuit.
- Since circuit must be opened and ammeter must be wired into it, don't use this procedure for troubleshooting.

Resistance Measurement

- An ohmmeter has a self-contained battery and requires no electrical power.
- When measuring resistance on a electrical component, first disconnect it from wire harness.
- An ohmmeter on a circuit that has voltage applied can result in damage to a meter.

NOTICE: Disconnect battery when performing ohmmeter tests or damage to ohmmeter may occur.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

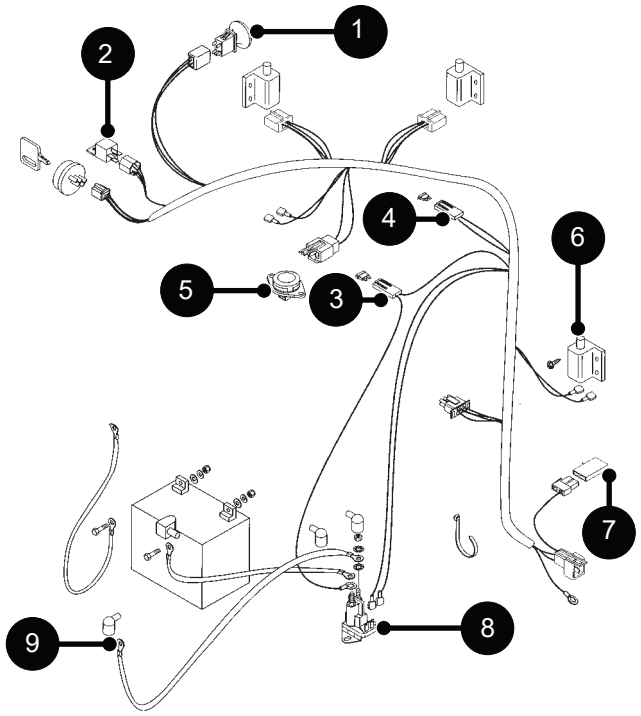
Disconnect battery as follows:

- Disconnect black ground cable from battery.
- Disconnect red positive (+) cable from battery.

WIRING COMPONENTS

See Figure 219.

Component location and cable routing:



1. PTO Switch
2. Relays
3. 30 Amp Main Fuse
4. 15 Amp Accessory Fuse
5. Seat Switch
6. Brake Switch
7. Diode
8. Starter Solenoid
9. To Starter

Figure 219

ELECTRICAL SERVICE

Safety Device Operation

When required operating conditions are not met, engine safety devices activate, preventing ignition or stopping unit. For safety operation details, see *Safety Device Operation* on page 13.

Battery Service

NOTICE: Supplied battery is maintenance free and only requires replacement, cleaning of terminals and charging.

DANGER: AVOID INJURY. Battery posts, terminals and related accessories contain lead. Wash hands after handling.

NOTICE: Remove battery before servicing.

Remove Battery

IMPORTANT: Save all parts and hardware for reinstallation.

See Figures 220 and 221.

1. Place unit in service position. See *Service Position* on page 10.

CAUTION: AVOID INJURY. Always disconnect black ground cable first to help prevent possible short circuits and dangerous situations.

2. Disconnect battery as follows:
   - Disconnect black ground cable from battery.
   - Disconnect red positive (+) cable from battery.
3. Remove battery strap. See Figures 220 and 221.

NOTICE: Several different batteries can be used on unit that have different hold-down strap placements.

4. Remove battery.

WARNING: AVOID INJURY. DO NOT drop anything metal onto both terminals. This could make contact between them.

Type 1
12V 12A - 190CCA

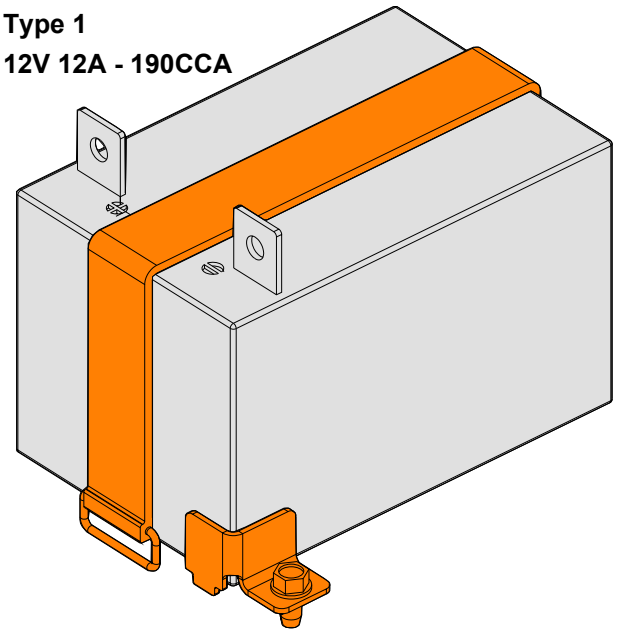


Figure 220

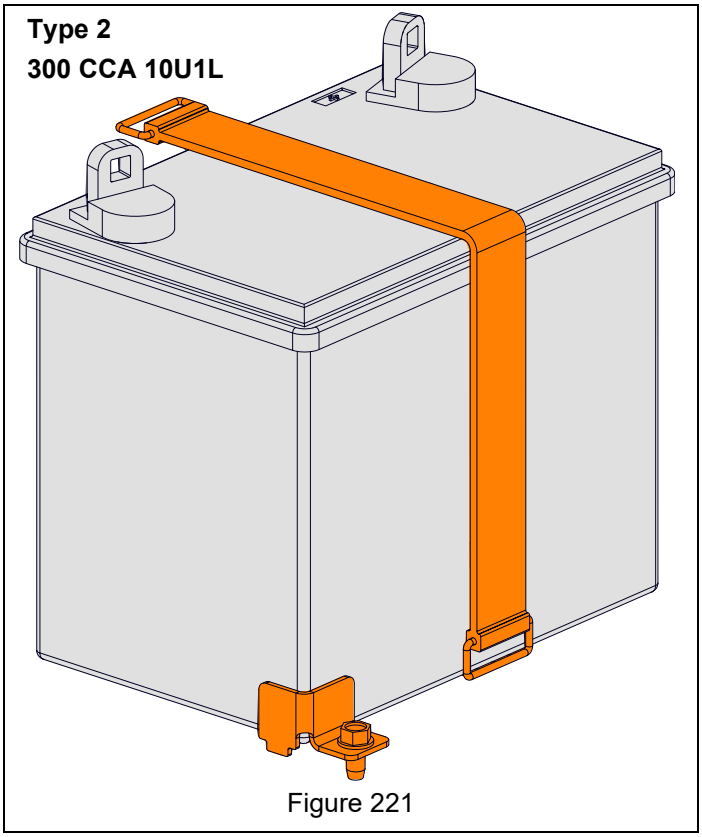


Figure 221

Installing 12V 12A - 190CCA (Type 1) and 300 CCA 10U1L (Type 2, U1)

Battery strap and bracket configurations for a Type 1 and Type 2 (U1) battery are different.

See Figure 222

1. Position bracket per battery type.
2. Place battery on battery tray so terminals are positioned nearest right side of unit.
3. Secure battery strap per battery type.

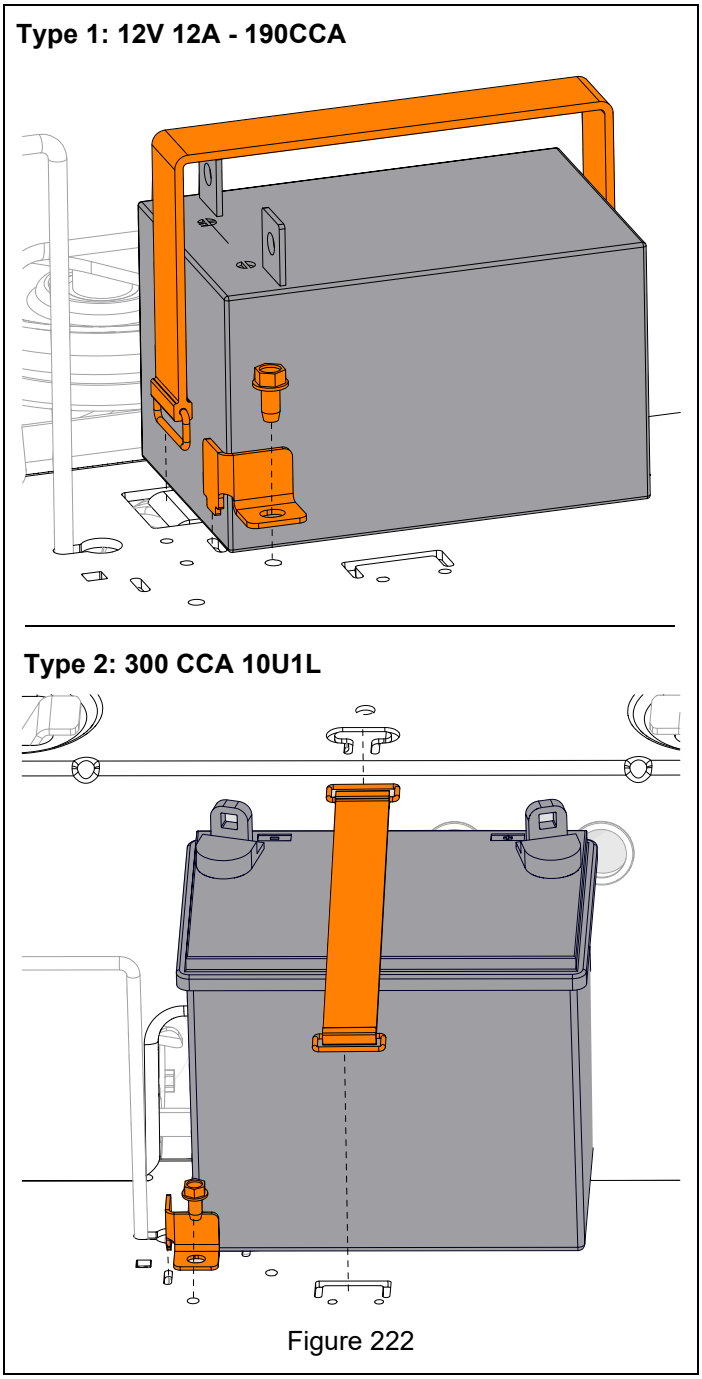


Figure 222

CAUTION: AVOID INJURY. Always connect red cable first to help prevent possible short circuits and dangerous situations.

4. Connect battery as follows:
   - Connect red positive (+) cable to battery.
   - Connect black ground cable to battery.
5. Return unit to operating position.

TROUBLESHOOTING

Table 4 shows common problems related to unit malfunction. Troubleshooting indicates probable cause and action required to correct.

Refer to Operator's Manual for general troubleshooting.

Table 4: Service Troubleshooting

Problem	Probable Cause	Correction
Engine does not start: Engine cranks over (spins over) but does not start	Conditions for starting have not been met	Troubleshoot engine. See Engine Mfg. for further help.
Engine does not start: Engine does not crank over	Conditions for starting have not been met	Check parking brake. See *Safety Device Operation* on page 13 and *Adjust Parking Brake - X Models* on page 53. Comply with all required conditions and test all switches. Check starter solenoid relay. Check battery voltage and battery terminals. See *Battery Service* on page 87. Check fuses. Check ignition switch. Check PTO switch. Make sure it is not pulled up, OR that it needs to be pushed down completely. Troubleshoot engine. See Engine Mfg. for further help.
Engine hard to start	Engine, Fuel and Electrical	Check choke cable connection. See *Engine Replacement* on page 24. Check fuel filter. See *Fuel Line Replacement* on page 33. Check spark plug wire(s) and spark plug(s) condition. Check electrical connections and components. Check engine for proper oil. Check for bad or low fuel supply.
Engine does not idle	Engine, Fuel and Electrical	Check for bad spark plug or gap. Check for bad or low fuel supply. Check electrical connections and components. Troubleshoot engine. See Engine Mfg. for further help.

Table 4: Service Troubleshooting

Problem	Probable Cause	Correction
Engine stops or misses	Engine, Fuel and Electrical	Check for bad or low fuel supply. Check electrical connections and components. Check spark plug wire(s) and spark plug(s) condition. Troubleshoot engine. See Engine Mfg. for further help.
Black smoke from exhaust	Engine	Check for dirty air filter. Check choke cable connection. See *Engine Replacement* on page 24. Troubleshoot engine. See Engine Mfg. for further help.
Battery does not charge	Electrical	Check fuses. Check for dirty battery cables and terminals. Check engine speed. Check electrical connections and components. Troubleshoot engine. See Engine Mfg. for further help.
Lights do not work	Electrical	Check lamp connections. Check lamps. Check fuses.
Unit does not track straight	Transaxles and / or linkages out of adjustment	Adjust steering. See *Adjust Tracking* on page 39.
Excessive vibration with mower deck engaged	Blades out of balance	Check for worn or damaged belts. Check engine speed. Only run deck at full throttle. Balance blades. See *Balance Blades* on page 74.
Machine vibrates or rattles with mower deck disengaged	Ground drive belts / unit is running at less than full throttle	Run unit at full throttle. Check for worn or damaged ground drive belts. See *Ground Drive Belt Replacement* on page 55.
Excessive noise or squeaks	Lubrication	Lubricate all grease points. See *Grease Fittings* on page 14.
Belt slips	Belts	Check for worn or damaged belts. See *Deck Drive Belt Replacement* on page 75 and *Ground Drive Belt Replacement* on page 55. Check idler spring tension.

CRITICAL TORQUES

COMPONENT	TORQUE (LB-IN)	TORQUE (LB-FT)	TORQUE (N•m)
Clutch Mounting Hardware	396 – 588	33 – 49	44.7 – 66.4
Engine Mounting Hardware (KOHLER Engines)	384 – 456	32 – 38	43.4 – 51.5
Engine Mounting Hardware (Kawasaki Engines)	288 – 312	24 – 26	32.5 – 35.3
Drive Wheel Lug Nuts	720 – 1080	60 – 90	81.3 – 122.0
Spindle Mounting Hardware (to deck)	144 – 192	12 – 16	16.3 – 21.7
Spindle Pulley Mounting Hardware	480 – 528	40 – 44	54.2 – 59.7
Mower Blade Hardware	360 + 210° ±5° (Not to exceed 1080)	30 + 210° ±5° (Not to exceed 90)	40.7 + 210° ±5° (Not to exceed 122.0)
Right Parking Brake Guard Mounting Hardware (Models 918300, 918301)	80 – 120	6.67 – 10	9.0 – 13.6
Left Parking Brake Guard Mounting Hardware (Models 918300, 918301)	80 – 120	6.67 – 10	9.0 – 13.6

SERVICE RECORD

DATE	SERVICE COMPLETED	NOTES

GRAVELY

655 WEST RYAN STREET
BRILLION, WI 54110

WWW.GRAVELY.COM

SEE PARTS, ACCESSORIES, AND ATTACHMENTS FOR YOUR UNIT AT PARTS.GRAVELY.COM.

A PARTS MANUAL FOR YOUR UNIT IS AVAILABLE FOR FREE DOWNLOAD OR PURCHASE AT GRAVELY.COM.

WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.

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